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ABSTRACT

Over the years, larger and larger portions of high school graduates have enrolled in 4-year colleges. Although many people view college as essential to success in the labor market, the movement toward 4-year colleges also has its critics. These critics contend that the public has come to believe that almost all high school graduates should go to college. This "college movement" is sweeping many marginally qualified or unqualified students into college, and hence the average ability of college students has declined. As a result of these declining ability levels, college noncompletion and dropout rates have increased. Many noncompleters do poorly in the labor market and would have been better advised to pursue other education and training options. These noncompleters are also burdened by unnecessary debts from college loans. Even college graduates are not doing very well in the labor market. This research synthesis examines the evidence for these arguments. Based on published literature identified through traditional bibliographic sources, ERIC, a variety of internet sources, research reports, and Ph.D. dissertations, the synthesis is designed to be empirical, even-handed, and as comprehensive as possible. Topics covered include: the growth of college expectations; changes in ability levels; changes in college completion rates; outcomes for noncompleters; and outcomes for college graduates. Appendixes contain tables; figures; Adjusting Post-1989 ACT Scores; and Research on Human Capital and Screening Theories. (Contains 196 references.) (Author/MKA)

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Research Synthesis

College for All?

Is There Too Much Emphasis on Getting a 4-Year College Degree?

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Research Synthesis

College for All?

Is There Too Much Emphasis on Getting a 4-Year College Degree?

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January 1999

This study is intended to promote the exchange of ideas among researchers and policy makers. The views expressed in it are part of ongoing research and analyses and do not necessarily reflect the position of the U.S. Department of Education.

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Preface

Often it is hard to tell what conclusions can be drawn from education research studies, because the studies on a given subject have not been examined systematically as a body of research. Analyses conducted at different times with different populations and different research methods often yield apparently inconsistent conclusions about the same subject. Given ambiguous research findings, advocates of one position or another may promote those that support their views, while ignoring or minimizing contrary findings. In such circumstances, researchers, policy makers, and practitioners, such as teachers and administrators, may lack the comprehensive, balanced, objective information they need. While many good syntheses of education research have been produced over the years, many topics have not yet been covered.

In response to this need, the National Library of Education (NLE) has undertaken a series of research syntheses on issues of public concern in education. Based on published literature identified through traditional bibliographic sources, ERIC, a variety of Internet sources, research reports, and Ph.D. dissertations, the syntheses are designed to be empirical, even-handed, and as comprehensive as possible.

This study of college outcomes is the second synthesis in the series. The result of a great deal of careful research, it should be especially useful to high school counselors and high school students contemplating options in postsecondary education.

Blane K. Dessy
Director
National Library of Education

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Chris Sheedy coordinated the editorial process for the manuscript. Judy Craig managed the National Library of Education's role in the publication process, and Eileen Schramm designed and formatted the report.

Executive Summary

Over the years, larger and larger proportions of high school graduates have enrolled in 4-year colleges. While many people view college as essential to success in the labor market, the movement toward 4-year colleges also has its critics. These critics contend that

❶ the public has come to believe that almost all high school graduates should go to college;

❷ this "college movement" is sweeping many marginally qualified or unqualified students into college, and hence the average ability of college students has declined;

❸ as a result of these declining ability levels, college noncompletion and dropout rates have increased;

❹ many noncompleters do poorly in the labor market and would have been better advised to pursue other education and training options;

❺ these noncompleters are also burdened by unnecessary debts from college loans; and

❻ even college graduates are not doing very well in the labor market.

This research synthesis examines the evidence for these arguments.

Is there a college-for-all movement sweeping the country, as the critics contend? There is if, by college, we mean either a 2-year or a 4-year college. Under this definition, almost all high school seniors—around 95 percent—expect to go to college. The proportion expecting to earn a bachelor's degree is smaller, but still substantial (69 percent). Somewhat fewer seniors (54 percent) say that they plan to enroll in the following October, and the proportion actually enrolling in 4-year colleges is smaller still (39 percent). One factor in the widespread college expectations among high school students may be the increased tendency of high school guidance counselors to encourage students of limited ability to attend "college."

Are college students less able than they were several decades ago, as some critics believe? Evidence from standardized achievement test scores suggests that they are about as able now as they were in the past. The test scores of college students did decline markedly from 1967 to 1980. However, they have since risen to at least their previous levels. If there is an increase in the number of lower-ability high school graduates going to "college" today, much of it may be getting absorbed by community colleges.

Critics of the college movement also believe that college completion rates are lower than in the past. The evidence suggests that there has been a modest decrease in the proportions of entering freshmen

who complete college within specified periods of time, such as 4, 5, or 6 years. However, at least part of this decrease is explained by the fact that students are typically taking longer to finish college than before. While noncompletion has increased only modestly in the last several decades, the number of students who leave 4-year colleges without graduating is large—over 600,000 per year by our estimate.

The labor-market performance of noncompleters tends to support the critics' case. Of course, they don't earn as much as college graduates, because they get fewer years of education. (If they are males, they also lose the extra earnings that a bachelor's degree adds even to 4 years of college.) More surprising, noncompleters at 4-year colleges tend to earn less than or the same amount as comparable individuals from 2-year colleges. They also gain about the same amount in tested cognitive skills for each year in college. In addition, they (or their parents) pay more in tuition and are more likely to have student loan debts then are 2-year college students.

Four-year college attendees from vocational programs seem to be an exception to the rule that non-completers don't do very well in the labor market. In controlled studies, their earnings exceeded those of other noncompleters from 4-year colleges and from community colleges. While evidence regarding the benefits of occupational programs in public technical colleges and private proprietary schools is mixed, shorter-term occupational training, such as that provided by the military and certain government programs also seems to pay off.

Since at least the 1970s, some critics of higher education have maintained that college was not a worthwhile investment even for many graduates. We examined the economic outcomes of college graduates in the labor force over time. Beginning in the late 1960s, college graduates of all ages moved into a broader range of jobs than before, including many traditionally considered "non-college" jobs. Most of this change took place in the 1970s. There was a little additional increase in the proportion of college graduates in these jobs in the 1980s. In the 1990s there were signs of a reversal in the pattern, especially among younger college graduates.

By 1994, about one tenth of employed college graduates aged 25–44 worked in occupations where the average education level was equal to or less than a high school diploma. The other 9 tenths were about evenly divided between college-level jobs and those requiring "some college", based on the average education levels of their incumbents in the early 1970s. College graduates in non-graduate jobs had lower literacy scores than those in college jobs, but they had much higher scores than high school graduates in jobs having the same mean education level as their own. At all job levels examined, college graduates earned more than high school graduates, and this advantage increased over time. Evidence reviewed later in the synthesis indicates that such premium increases are due largely to rising skill requirements in jobs.

Along with the change in the occupations of college graduates, their real annual earnings (adjusted for inflation) fell during the early 1970s, but then recovered much of their loss. College graduate earnings remained fairly stable, with some fluctuations, from 1975 through the mid-1990s, although they did not return to their 1972 high. On the other hand, the real earnings of high school graduates fell gradually, in an uneven pattern, from 1970s to the mid-1990s, and those of high school dropouts fell off more markedly. In the tight labor market of mid-1998, the earnings of most groups, including low-income workers, improved.

The premiums of college graduates—their extra earnings above those of high school graduates, expressed as a percentage—and the rates of return on investment in college also fell in the 1970s, but they increased markedly thereafter. By the 1990s, they were higher than in 1970.

For the average bachelor's degree graduate, then, college is a good investment—graduates realize about a 12 percent return on investment, based on lifetime earnings. Further, the total economic benefits of college completion are probably at least twice the earnings benefits, and college offers a range of noneconomic benefits as well.

The large and rapidly expanding literature on wage inequality helps explain the changes in the economic performance of college graduates over time. College premiums—which express the degree of inequality in earnings between college graduates and high school graduates—dropped in the 1970s because of a great increase in the supply of college graduates. Enrollments ballooned in the late 1960s and early 1970s, encouraged by high premiums in the 1960s and pushed up especially by draft deferrals during the Vietnam War. In the 1980s, the college premium increased sharply, in part because of a deceleration in the growth of the college graduate supply. The main cause of the rising premiums, however, was technological change favoring more skilled workers. New technology, including the computer revolution, tended to replace lower-skilled with higher-skilled workers. As demand for less skilled workers dropped and the range of jobs for which they could compete narrowed, their wages went down. The loss of manufacturing jobs to developing countries exacerbated the labor market problems of less skilled workers, such as high school graduates and high school dropouts, but was not the primary cause. The decline of labor unions and the decline in the real minimum wage in the 1980s also contributed to the growth of wage inequality but were not the primary cause of it.

Skill-biased technological change has been driving up the demand for skills such as those of college graduates for a long time. In 1975, Tinbergen commented on "the race between technological development and access to education." Except in the 1970s, the supply of skills has not kept pace with demand, and the premiums of more skilled workers have increased.

Based on the research, we believe that high school graduates of modest ability or uncertain motivation who are thinking of enrolling in 4-year colleges would be well advised to consider attending 2-year colleges instead. If they did so, they would probably realize the same earnings and cognitive skill gains at lower cost and with less debt. High school guidance counselors should be more realistic than many are at present in advising lower-achieving or less motivated high school seniors about their postsecondary options. Students who do enroll in 4-year colleges should do everything in their power to complete their programs and graduate.

The implications of this research for public policy are harder to draw. It is clear that the nation needs to improve the skill levels of the workforce. How this can best be accomplished is an extremely complex question. We briefly go beyond the research to reflect on various alternative approaches to raising skill levels—increasing the number of 4-year college graduates, expanding subbaccalaureate education, improving elementary/secondary education, and expanding continuing occupational education and training. Improved elementary/secondary education seems to offer far-reaching benefits, but more knowledge about the most cost-effective ways to increase skills is needed.

We conclude that since at least the turn of the century, the nation has responded to the growing demand for skills by raising the mean education level of the work force, that is, by adding years of education. This process continues, but as time goes on, the cost of each additional year of education will become less and less affordable, and it will become ever more important to increase the learning and skills yielded by a year of education at earlier stages. Advanced Placement (AP) courses in high school represent a step in this direction.

Contents

Preface	iii
Acknowledgements	v
Executive Summary	vii
Introduction	1
The Growth of College Expectations	5
Changes in Ability Levels	8
Changes in College Completion Rates	11
Outcomes for Noncompleters	16
Economic Outcomes	16
Cognitive Skill Gains	18
Debt Burden	19
Outcomes for College Graduates	20
Occupational Change	20
Economic Benefits	25
The Real Earnings of College Graduates	27
College Premiums	28
Internal Rates of Return to College	29
The Value of a College Degree in Perspective	32
Conclusion	39
Endnotes	43
Bibliography	48
Appendix A: Tables	62
Appendix B: Figures	71
Appendix C: Adjusting Post-1989 ACT Scores	74
Appendix D: Research on Human Capital and Screening Theories	77

Introduction

The average education level of Americans has been increasing since the early years of the republic. At the end of the 19th century, there were far fewer high school graduates, relative to the population, than there are college graduates today, and high school graduates were regarded in somewhat the same light as college graduates were later on. In 1892, an influential committee on secondary schooling headed by Harvard president Charles W. Eliot wrote that the main function of secondary school was to:

> prepare for the duties of life that small proportion of all children in the country—a proportion small in number but very important to the welfare of the nation—who show themselves able to profit by an education prolonged to the eighteenth year, and whose parents are able to support them while they remain so long at school (Sizer 1964).[1]

Today, we wouldn't consider even college graduates "a proportion small in number," since they constitute more than one quarter of all 25–29-year-olds (27 percent). At the turn of the century, however, the median education level of white males was 8th grade, and high school graduation was still rare (Kroch and Sjoblom 1994). By 1920, just 22 percent of those between the ages of 25 and 29 were high school graduates. By 1940, some 38 percent of this age group had graduated from high school, but only 6 percent had bachelor's degrees. It was not until after World War II that the majority of young people graduated from high school. By mid-century, 53 percent of people age 25–29 were high school graduates, but just 8 percent were college graduates (Snyder et al. 1998). At that time, a high school diploma was generally regarded as the achievable standard required to get a good job and support a family.

Today, "some college" in either a 2-year or 4-year school has become the norm,[2] and many consider a bachelor's degree essential to economic success. Demand for college-level skills in the labor market is reflected in the college premium—the percentage by which the earnings of college graduates exceed those of high school graduates. The college premium shot up in the 1980s and remains high today. Newspaper reports of a high level of corporate recruiting on campuses and even at spring vacation playgrounds such as Fort Lauderdale are indications of the demand for college-level skills.

The supply of college graduates increased markedly in the late 1980s and the 1990s, no doubt in response to increased demand. In the six years between 1988 and 1994, the number of bachelor's degrees conferred annually by 4-year institutions increased 18 percent, from 995,000 to 1,169,000, while the population of 20–24 year-olds decreased 6 percent. We will call the growing inclination of young people to enroll in 4-year colleges, and the widespread public support for this educational path, "the college movement."

While most people consider college a worthwhile or even a necessary investment, some researchers and policy makers believe that there is too much emphasis on enrolling in 4-year colleges. For example, House Education and Labor Committee chairman William F. Goodling has said, "We're overselling college: the 4-year, traditional conception of a college education" (Stanfield 1997).[3] Similarly, former

Labor Department Secretary Robert Reich has argued that "too many families cling to the mythology that their child can be a success only if he or she has a college degree" (Stanfield 1997).[4] Researchers Kenneth Gray and Edwin Herr (1996) have argued that 4-year colleges could better serve students in the lower two thirds of their classes by setting up two-year programs leading to technical degrees: "Unless post-high school technical education receives the nurturing it needs, it will continue to decline, depriving our less-than-top students of the opportunities they need for the success they deserve."[5]

The current debate echoes a more heated and broadly public argument in the 1970s about the value of higher education. In the early 1970s, there was a marked decline in the college premium, especially in the first job after college. Many researchers and educators saw the decline as evidence of "overeducation" in an excessively credential-conscious society. In effect, the argument went, the job market did not require all the education that was being produced. Richard Freeman's *The Overeducated American* (1976) found a glut of college graduates in the early 1970s. He predicted that

> the period of severe "overeducation" is likely to last for about a decade, to be followed by a period of market balance at a lower plateau. In contrast to the past, higher education will be a "marginal" investment, not a sure "guarantee" to high salaries and occupational standing...[6]

He also predicted that with the decline in the value of education, individuals would search for alternative routes to economic advancement and that the reduced role of schooling in social mobility would lead to greater class conflict.

In a similar vein, Boris Blai (1983) argued that a growing imbalance between (increasing) education levels and actual skill requirements in the workplace created the potential for job dissatisfaction, decreased productivity, and ultimately a crisis in public confidence in the economic system. Ivar Berg's *Education and Jobs: The Great Training Robbery* (1970) maintained that the education system, and especially higher education, provided "sluice gates" through which well-to-do American youth were channeled into better paying jobs, regardless of their productivity, thereby maintaining and reinforcing an inequitable class structure. Berg argued for a shift in the allocation of public education funds from postsecondary to elementary and secondary education.

When the college premium rose sharply in the later 1980s, this strand of criticism was muted. However, with the high enrollment rates of the 1990s, critics were again arguing that there was too much emphasis on 4-year colleges and that more attention should be given either to improving secondary education or to practical, occupationally-oriented postsecondary education, especially at the sub-baccalaureate level (e.g., Gray and Herr 1996). In contrast to Berg's contention that colleges screen out lower-class students, critics today tend to argue that growing numbers of college students with modest abilities might be better served by other forms of education.

The basic arguments of the college movement's critics are as follows:

❶ Within the last several decades, people have come to expect that most or all high school graduates should go to college. Washington Post columnist Richard Harwood (1997a) comments on "the debate about the conventional wisdom that 'everyone should go to college'." Stark, Jennings, and Halperin

(n.d.) observe that "the majority of today's students feel they 'have to' go to college."[7] Though these statements could apply to either 2-year or 4-year college, the *National Journal's* Rochelle Stanfield (1997) is more explicit in criticizing the "misguided canon that a bachelor's degree in liberal arts is the key to success."[8] Writing in the *Chronicle of Higher Education*, Kenneth Gray and Edmund Herr (1996) contend that a bachelor's degree at a 4-year college is considered "the 'one way to win' paradigm."[9] The authors argue that high school counselors' "indiscriminate advice [to go to college] is dangerous, because it leads too many teenagers to failure, disappointment, and debt."

❷ Many young people who do not have the ability or educational preparation to perform well in 4-year colleges are being encouraged to enroll. Over the years, colleges have increasingly admitted students whose chances of doing well are slim. According to Harwood (1997a), "the 'mythology'...that a diploma equals economic success produces college enrollees who may have neither the academic aptitude nor the interest required for a degree....Many students leave high school unprepared for college or the labor market. They are more or less forced into college to satisfy employers who...have a need for 'numerate-literate kids, but can't trust a high school diploma to mean anything on those grounds'."[10] According to Gray and Herr (1996), "the 'one way to win' paradigm is not realistic, given [the] academic talents [of many young people] and labor market projections."[11] Stanfield (1997) notes that "many who enter the ivy-covered precincts are ill-prepared. Nearly four-fifths of institutions that accept freshmen say that they offer remedial courses, and nearly one-third of entering freshmen take at least one remedial course."[12]

❸ Even with remedial programs, college dropout rates have become unacceptably high. Commenting on a *Washington Post* article on the low graduation rates among Georgetown University basketball players, Harwood (1997a) says, "the story here is not whether a handful of basketball players is out of place in the classroom, but whether millions of other college students are in the same boat." In another column (Harwood 1997b), he notes that "nearly half the students now attending college are already dropping out before completing their studies." Robert Reich observes that "sadly, far too many young people are going to college who are not finishing college, and who are finding that what they're being trained for in college has little or no relevance to getting a good job" (Stanfield 1997).[13] Gray and Herr (1996) argue that "students ranking below the top third of their high school graduating class too often fail to earn a bachelor's degree if they enroll in college."[14]

❹ Many college noncompleters do poorly in the labor market and would have been better off enrolling in 2-year colleges and occupational programs. In Stanfield's (1997) words, "hundreds of thousands of young Americans will embark on college educations—only to find frustration, failure, lots of debt, and the need...to learn something practical at a place without ivy."[15] Gray and Herr (1996) believe that "students unlikely to earn a bachelor's degree need other ways to win ..." In their opinion, "four-year institutions could better serve students from the bottom two-thirds of their high-school class by setting up programs that offer two-year associate's degrees in technical areas." They argue that technical jobs such as those for precision welders, avionics-repair technicians, radiology technicians, and professionally trained chefs are the "best places for students from the bottom two-thirds of their high school class to find 'other ways to win'."[16] Harwood (1997b) makes a similar argument: "Community colleges...have a big role to play in the upgrading of the labor force." The demand for physical and occupational therapists, medical assistants, home and residential care aids, medical records technicians, and other specialists is growing rapidly. Efforts to expand community colleges "make more sense than the overemphasis on four-year college degrees for every child..." Stark, Jennings, and Halperin (n.d.)

have this advice for college seniors contemplating college: "You have to have determination to stick it out, and if you are uncertain about your commitment to 4 years of college, you may want to think about pursuing an associate's degree from a community college or a certificate program from reputable trade or technical school. In today's society, it is not 'a bachelor's degree or bust'."[17]

❺ Moreover, many college students—especially dropouts—are burdened with debt accumulated from loans that could have been avoided or minimized by choosing other education and training options. According to Gray and Herr (1996), "piling up debts from student loans hurts those who never finish college or who finish but are unemployed."[18] Stanfield (1997) observes that "most dropouts are left with big debts and mediocre immediate job prospects."[19] In Harwood's (1997a) opinion, an important factor in the college dropout rate is "the high cost of a college education and the accumulation of debt in the course of paying for it."

❻ Many college graduates are not doing well in the labor market, either. Often, graduates find themselves in low-paying service jobs and other lines of work not traditionally associated with a college education. "Many of those who obtain a bachelor's degree discover it doesn't live up to its advertising" (Stanfield 1997).[20] "Even among college graduates, many will lose in the labor market" (Gray and Herr 1996).[21]

We will examine these arguments about the value of a four-year college education, drawing especially on the empirical literature of the last decade. Wherever possible, we will rely on studies based on systematic national data.

The Growth of College Expectations

The first point made by the critics is that people have come to believe that most or all high school graduates should go to college. Stanfield (1997), for example, observes that 96 percent of teenagers polled by the Public Agenda Foundation said that going to college was "important." This finding is certainly relevant, but it doesn't tell us how expectations have changed over the years or what kind of institution students have in mind when they refer to "college."

Data from three longitudinal surveys conducted by the National Center for Education Statistics (NCES) enable us to address these questions. The data, based on nationally representative samples of high school seniors, are drawn from the National Longitudinal Study of 1972 (NLS72); High School and Beyond (HSB), the 1980 Senior Cohort; and the National Education Longitudinal Study of 1988 (NELS), Second Followup, 1992. Table 1 shows (a) the percentage all seniors in 1972, 1980, and 1992 who expected to complete various levels of education, (b) the percentage who planned to continue with

Postsecondary educational expectations, plans, and enrollments of high school seniors **Table 1**

a. Percent of all seniors who expected to attain various levels of education

	1972	*1980*	*1992*	*% change 1972–1992*
Expected attainment				
High school or less	18.9	19.5	5.3	-72.0
Some college	30.9	34.5	25.3	-18.1
Finish college	37.6	25.5	36.1	-4.0
Graduate school	12.6	20.5	33.3	164.3
% at least some college	81.1	80.5	94.7	16.8

b. Percent of high school seniors who expected to enroll in postsecondary institution the following October

	1972	*1980*	*1992*	*% change 1972–1992*
Institution				
Trade or tech	8.8	6.0	3.6	-60.0
2-year college	16.7	14.5	18.7	12.0
4-year college	33.6	38.3	54.0	60.7
Any college	50.3	52.8	72.7	44.5

c. Percent of high school graduates who actually enrolled in college the following October* (1973, 1981, and 1993)

	1973	*1981*	*1993*	*% change 1973–1993*
Institution				
2-year college	14.9	20.5	22.4	50.3
4-year college	31.7	33.5	39.1	23.3
Any college	46.6	54.0	61.5	32.0

*Enrollment in college in October 1973, 1981, and 1993 for individuals age 16–24 who graduated from high school in the preceding 12 months.

Source: For parts a and b, Snyder and Hoffman (1995), *Digest of Education Statistics 1995*, table 177. For part c, Smith et al. (1997), *The Condition of Education 1997*, indicator 8.

postsecondary education in the following year, and (c) the percentage of high school graduates in 1973, 1981, and 1993 who enrolled in the following year.[22]

Part "a" of the table shows that 95 percent of 1992 seniors expected to finish at least some college—virtually the same as the proportion of teenagers in the Public Agenda poll who said college was important. This NCES finding represented an increase from 1972, when 81 percent said they intended to finish at least some college. Even then, the great majority of high school seniors saw college in their future. However, smaller proportions expected to attain at least a 4-year degree. In 1972, 50 percent of the seniors said they expected to get a bachelor's degree or a graduate degree. In 1992, 69 percent of the seniors said so. The increase in those expecting to earn a bachelor's degree or higher was accounted for entirely by the increase in seniors expecting a graduate degree, from 13 percent in 1972 to 33 percent in 1992. In general, as the "% change" column shows, there was a net upward shift across levels of expected educational attainment over this period.[23]

It is one thing for seniors to have general expectations about finishing college and another to have plans to enroll in the immediate future. Part "b" of the table shows the proportion of high school seniors planning to continue their education the following fall. In 1992, some 73 percent planned to enroll in a 2-year or 4-year college in the fall. This represented a substantial increase from 1972, when half of the seniors had such plans. Over the same period, those planning to attend 4-year schools increased from 34 percent to 54 percent. In general, as in part "a," there was net upward shift in plans for postsecondary education over this period. Between 1972 and 1992, the proportion planning to attend trade or technical school fell 60 percent, while the proportion planning to enter a 4-year college increased 61 percent.

To what extent are these plans realized? Part "c" of the table shows the proportion of youth graduating from high school in the 12 months preceding October 1973 (1981, 1993) who were enrolled in 2-year or 4-year colleges that October. In 1993, only 39 percent of graduating seniors actually enrolled in a 4-year college the October following graduation, a modest increase from 32 percent in 1973. A comparison of Parts "b" and "c" of the table suggests (but does not demonstrate[24]) that the gap between plans to attend a 4-year college and actual attendance grew over this period. In 1972–73, the difference was only 1.9 percent (33.6 percent vs. 31.7 percent). By 1980–81, the gap had increased to 4.8 percent, and by 1992–93, to 14.9 percent. We do not know why the apparent disparity between plans and enrollments increased, but one reason may be that many high school seniors, thinking they are expected to go to college, answer questions about their plans by giving what they consider the desired response. Some are unable to carry out their plans for 4-year college and go to community college instead. Between 1973 and 1993, the October enrollment growth in 2-year colleges for recent high school graduates was about twice that of enrollment growth in 4-year colleges.

Changes in high school guidance counseling may have contributed to the rising expectations about college and to the growing gap between expectations and outcomes. As Rosenbaum et al. (1996) and Rosenbaum (1998) point out, counselors acted as gatekeepers in the 1960s, restricting the flow of high school graduates into college. Criticism of this gatekeeping role and the expansion of community colleges led counselors to change their approach, the authors believe. In 27 interviews in the Chicago area, they found that counselors do not like giving low-achieving students bad news about their future prospects, do not think they have the authority to do so, and instead advocate "college for all." Students of limited ability are encouraged to enter community colleges and possibly transfer to 4-year

schools to earn their bachelor's degrees. However, Rosenbaum observes, their subsequent performance in community college is poor, on average, and they tend to drop out after a while.

Statistical evidence supports Rosenbaum's argument about changes in high school counseling. Gray and Herr (1996) reported that in 1982, 32 percent of the seniors in the High School and Beyond Survey[25] said their guidance counselors urged them to go to college. In 1992, more than *twice* as many seniors in the National Educational Longitudinal Survey—66 percent—said their counselors urged them to do so. Even among seniors in the bottom half of academic rankings, 57 percent said their counselors recommended college.

In sum, there is among high school students a generalized expectation of "college for all," if by "college" we mean either a 2-year or 4-year institution. If we limit ourselves to 4-year schools, a substantial majority of seniors (69 percent) have a general expectation that they will attain bachelor's degrees. If we limit our scope to plans to attend a 4-year college in the immediate future, we find that 54 percent of high school seniors had such plans in 1992. The proportion of recent high school graduates who actually enrolled in a 4-year college was smaller still (39 percent). The gap between 4-year college plans and enrollments seems to have increased between 1972 and 1992, and community colleges probably absorbed some of those with unrealistic plans. In general, the data are consistent with the critics' contention that expectations about college are outrunning students' abilities and/or interest in attending, although other explanations are possible.

Changes in Ability Levels

The critics we reviewed believe that because of the general enthusiasm for college, many young people who do not have the ability or educational preparation to perform well in 4-year colleges nevertheless enroll in them. What do the data tell us about the qualifications of 4-year-college students and how their abilities have changed over time?[26]

A study by Berkner et al. (1997) sheds some light on the extent of enrollment in 4-year colleges by high school graduates of limited ability. Using National Educational Longitudinal Survey (NELS) data, the authors constructed a scale to measure qualification for admission to 4-year colleges. At the top of the scale were those "very highly qualified" students whose highest value on any of five criteria would put them among the top 10 percent of 4-year college students. The criterion items were high school grade point average, class rank percentile, NELS test percentile, combined Scholastic Aptitude Test (SAT) scores, and/or composite American College Test (ACT) score. At the bottom of the scale were "marginally or not qualified" students for whom all values were in the lowest quartile.

The authors found that a little over one-third (35.5 percent) of the 1992 high school graduates were marginally qualified or not qualified to attend a 4-year college. Of that one-third, 47.9 percent had no postsecondary education as of 1994, 37.3 percent were enrolled in 2-year or other subbaccalaureate institutions, and 14.7 percent were enrolled in 4-year colleges. Hence, most of these poorly prepared high school graduates with postsecondary experience were attending subbaccalaureate institutions, not 4-year colleges.

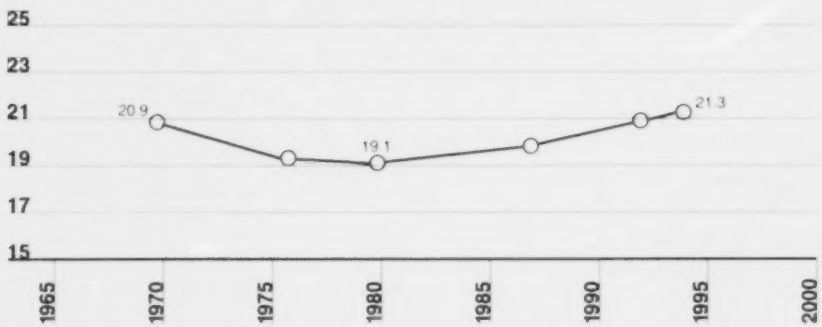
Viewing the surveyed students from another angle, the authors found that 11.3 percent of the NELS high school graduates who *were* enrolled in 4-year colleges were marginally or not qualified to attend, based on the criteria used. Another 12.6 percent were "minimally qualified," meaning that they did meet the minimal qualifications for 4-year college but did not exceed them by much. One may question the cut-point on the scale that distinguishes the marginally or not qualified from the minimally qualified. But even if we eliminate the line and say that somewhere between one-ninth and one-fourth of college students have shaky academic qualifications at best, it is not clear that this situation is different from the past or that such proportions are wildly excessive, given the multiplicity of goals in college admissions.

Have the abilities of 4-year college students changed over the last several decades? The American College Tests (ACTs) provide a good direct measure of the cognitive skills of these students. The tests are designed to yield valid and reliable information on the achievement of high school seniors interested in attending college. In addition to producing and administering the tests, the ACT organization conducts annual surveys of 2-year and 4-year colleges participating in its program to collect information from administrative records on freshmen who took the test in high school, usually in the previous school year. A broad range of colleges participates in the ACT Program, but they differ from the universe of American colleges in a number of ways. They are more likely to be located in the Midwest, the Rocky Mountain States, the Great Plains, and the South. They are also more likely to be public colleges and universities, less likely to be elite private universities. Like all surveys, the ACT college surveys have some nonresponse, which may introduce its own biases. Further, not all students in these colleges

took the test. Despite these limitations, however, the survey data provide useful information about large numbers of freshmen at a wide range of American colleges, both public and private.[27]

Until 1989, the ACT measured reasoning abilities in 4 areas—English, math, social studies, and natural sciences. A composite score provided a summary of performance on the 4 tests. In 1989 the tests were rewritten. The social studies test was replaced by a reading test—not as big a change as it might seem, because the earlier social studies test had emphasized reading and problem solving. The other subject areas—English, math, and science—remained the same. Since scores on the new version of the test were higher than those on the old version, we have deflated them in order to make them comparable (see appendix C). Figure 1 shows the mean ACT composite scores of freshmen in the 4-year colleges surveyed.

Mean ACT Composite Scores, College Freshman 1971–1994 **Figure 1**



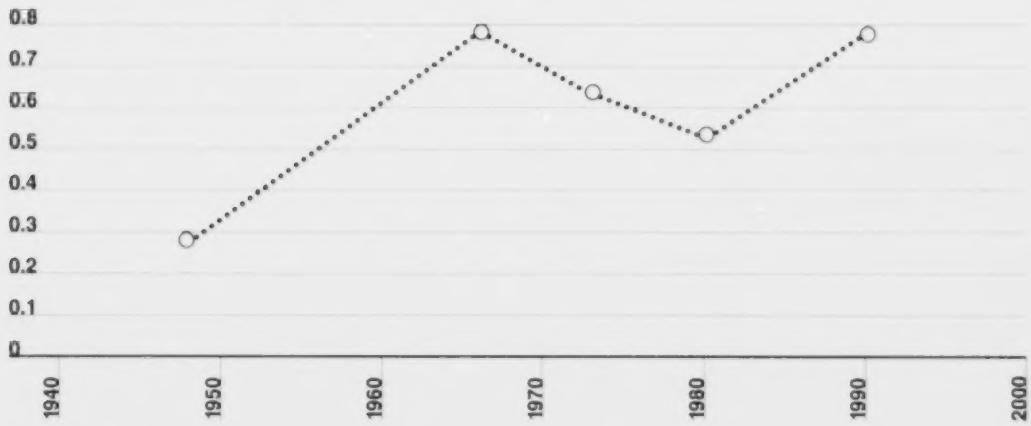
Source: American College Testing Program (1972, 1976, 1980, 1987, 1992, 1995).

The ACT composite scores of freshmen dropped between 1970 and 1980. This drop was part of the more general decline observed in a number of different achievement tests in the late 1960s and the 1970s, including the Scholastic Aptitude Test (SAT).[28] The ACT scores then increased in the 1980s, and by the mid-1990s they slightly exceeded the levels of the early 1970s. Appendix figure B-1 shows the changes over time in mean math and English scores on the ACT tests. Both show the same basic pattern, except that the English scores in 1994 slightly exceeded those in 1970, and the math scores did not quite reach their 1970 levels.[29]

Bishop (1989) found a similar pattern in the General Intellectual Ability (GIA) scores that he developed using Iowa Test of Educational Development (ITED) scores, age, and schooling. Bishop estimated the GIA scores of 17-year-olds entering college (among others), based on the proportion of each cohort of seniors enrolling in college.[30] Figure 2 shows the changes in these scores from 1948 to 1990.

Bishop reported a marked increase in the estimated mean GIA scores of college freshmen between 1948 and 1966. The quality of students entering college rose partly because of improvements in the achievement levels of high school graduates and partly because colleges were introducing more selective admissions policies. Like the ACT data, Bishop's estimates then showed a drop in scores between 1967 and 1980, followed by a rebound. By 1990, the estimated GIAs of college freshmen were very close to those of freshmen who had entered college in 1966.

Figure 2 General intellectual ability scores of college freshmen (standard deviation units)



Source: Bishop (1989).

Bishop (1989) also calculated composite test scores for college seniors applying to graduate schools, combining information from the Graduate Record Examination (GRE) achievement and subject matter tests and from the Law School Admissions Test (LSAT), the Graduate Management Admissions Test (GMAT), and the Medical School Admissions Test (MCAT). He reported a test score decline in the late 1960s and in the 1970s, followed by a rebound in the 1980s to levels exceeding those in the mid-1960s. His composite score fell .121 standard deviations between 1966 and 1980 but then rose by .173 standard deviations between 1980 and 1989.

10

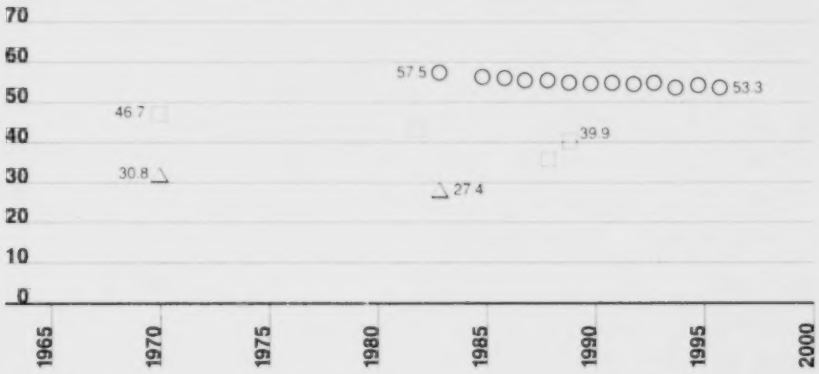
In general, there is not much evidence for the critics' contention that the college movement has swept large numbers of unqualified young people into 4-year schools. By one systematic measure, 11 percent of college students were not qualified to attend and another 13 percent had the minimal qualifications. We don't know whether these proportions are larger or smaller than in the past. However, using composite ACT scores, we see that the measured abilities of college freshmen fell from the mid-1960s to about 1980, then increased and exceeded their earlier levels. Other data from Bishop (1989) show a similar pattern. Even though enrollments have increased greatly, college students today are at least as able as they were 4 decades ago, by these measures. If there has been growth in the number of lower-ability students moving into postsecondary education, much of it is apparently being absorbed by community colleges, consistent with Rosenbaum's argument.

Changes in College Completion Rates

Another part of the argument against the college movement is that completion rates in 4-year colleges are lower than they used to be and dropout rates, higher. Estimates of college completion and dropout rates vary widely, depending on definitions, sample specifications, reporting methods, and other factors. Some studies define completion as attainment of a bachelor's degree, others define it as completion of 4 years of college, still others, a combination of elements. Studies vary in the length of time allowed for college completion to occur—4 years, 5 years, 6 years, or more. Some studies include just full-time students, while others include both full-time and part-time students. Some measure completion at the institution first entered, others measure it at any college. In most studies, the unit of analysis is students, but in some, it is institutional reports of retention. In assessing changes in completion and dropout rates, then, it is important to be sure that the phenomena measured and the methods of measurement remain the same over time. The best way to do this is to examine changes reported in single studies or in series, each of which has the same definitions, sample specifications, reporting methods, etc. at different points in time.

Several studies have examined changes in college completion rates, using systematic national data (American College Testing Program 1996, Astin et al.1996, Grubb 1989). One common measure from these studies is the proportion of full-time students entering a 4-year college who graduate from the same institution within a given period of time. This is useful information, but it has some limitations. If we assume that the issue in question is the aggregate 4-year college completion rate, the fact that part-time students are excluded from these estimates probably biases them upward, while the fact that completions are defined as graduation from the college of initial entry (rather than all colleges the student may attend) probably biases them downward. In assessing changes over time, however, such biases are often tolerable, as long as the samples, methods etc. remain constant.

Completion rates over time in college of initial entry (percent) **Figure 3**



Source: Grubb (1989), Astin et al. (1996), ACT (1996).

We will first examine completion rates at the college of initial entry. Then we will turn to the few statistics describing changes in rates of dropout from one institution and from all institutions attended.

Figure 3 shows that rates of completion at the college of initial entry over given periods of time have declined moderately since 1970.

In surveys by the Cooperative Institutional Research Program (Astin 1972, 1990, 1996, Green et al. 1983), 4-year graduation rates showed a net decline from 1970 to 1989. An estimated 46.7 percent of 1966 college entrants had graduated by 1970, while 39.9 percent of 1985 entrants had graduated by 1989. However, there was a slight apparent increase from 1988 to 1989. In another study, Grubb (1989) using data from the National Longitudinal Survey of 1972 and the High School and Beyond survey, calculated the 4-year graduation rates of students entering college from the high school classes of 1972 and 1980. He found that 30.8 percent of the 1972 entrants had earned bachelor's degrees at their college of initial enrollment within 4 years. The 1980 entrants had a little lower graduation rate, 27.4 percent. Other data come from the American College Testing Program, which surveys colleges each year, asking institutions to report on their retention and completion rates. The American College Testing Program (1996) found that graduation rates over 5-year periods at 4-year colleges declined from 57.5 percent in 1983 to 53.3 percent in 1996.[31]

Grubb (1989) reported that there was no difference in 4-year *dropout rates* at the college of initial enrollment for those who entered in 1972 and 1980—19.4 percent and 19.3 percent respectively. (Completion rates can fall while dropout rates remain the same over 4 years because at the end of this period, some students are still in college or have attained other credentials.[32]) However, across *all* colleges—not just the college of initial enrollment—Grubb found some increase in the dropout rate: 25.1 percent of the 1972 entrants had dropped out 2 years later, as compared to 28.8 percent of the 1980 entrants.

In other measures of persistence, the American College Testing Program (1996) found that freshman-to-sophomore dropout rates from the college of initial entry increased from 24.5 percent in 1983 to 26.9 percent in 1996. Along the same lines, Postsecondary Education OPPORTUNITY (1996) reported that freshman-to-sophomore *continuation rates* decreased from 68 percent in 1983 to 66.9 percent in 1995.

Some of the modest decline in college completion rates over a given period of time—whether 4, 5, or 6 years—is due to the fact that the average college student is taking longer to complete a degree. NCES found that between 1977 and 1990, the proportion of bachelor's degree graduates who completed their education within 4 years of high school fell from 45 percent to 31 percent, while the proportion completing degrees more than 6 years after high school increased from 25 percent to 32 percent (Smith et al. 1996).[33]

Although noncompletion rates have not changed greatly over the last several decades, they may still be a matter of concern. How many students leave college each year without getting degrees? We can make a rough estimate from the completion rates over time, just discussed, and from single-time completion rates reported in other studies. Table 2 shows these rates.

The rate of graduation from 4-year colleges can be approximated by examining the estimates in bold for later measurement years (1994-96) and longer times from point of entry (5 or more years). These range from 44.9 percent to 57.1 percent. Periods longer than 6 years do not seem to increase completion rates much. Astin et al. (1996) found that completion rates after 9 years were less than a

Table 2 **Bachelor's degree completion rates in different studies**

Author	*Enrollees and baseline year*	*Followup*	*Enrollment status*	*Completion at*	*Percentage completing by years after entry in college*			
					4 years	*5 years*	*6 years*	*>6 years*
Astin (1972)	Freshmen 1966	1970	First time, full-time	Initial 4-yr. college	46.7			
Grubb (1989)	Freshmen 1972	1976	First time, full-time	Initial 4-yr. college	30.8			
Velez (1985)	All 1972	1979	**	Any college				79.0
Green et al. (1983)	Freshmen 1978	1982	First time, full-time	Initial 4-yr. college	42.8			
ACT (1996)	*	1983	**	**		57.5		
Grubb (1989)	Freshmen 1980	1984	First time, full-time	Initial 4-yr. college	27.2			
Carroll (1989)	Freshmen 1980	1984	First time, full-time	Initial 4-yr. college	40.1			
Porter (1989)	All 1980	1986	First time, full-time	Any college			40.7	
Astin (1990)	Freshmen 1984	1988	First time, full-time	Initial 4-yr. college	35.1			
Astin (1996)	Freshmen 1985	1989	First time, full-time	Initial 4-yr. college	39.9			
Snyder et al. (1997)	Freshman 1989 - 1990	1994	Full-time, part-time	Any college		**45.8**		
Smith et al. (1996)	Freshman 1989 - 1990	1994	First-time, full-time	Any college		**57.1**		
Astin (1996)	Freshman 1985	1994 - 1995	First-time, full-time	Initial 4-yr. college			**44.9**	**45.7**
ACT (1996)	*	1996	**	**		**53.3**		

* Institutional completion reports.
** Not reported.
Source: Studies in this table.

percentage point higher than rates after 6 years.[34] Based on the data in bold print, we conclude that somewhere around half of the freshmen entering 4-year colleges eventually graduate.

In 1995, NCES estimated that there were 1,151,000 first-time freshmen in 4-year colleges (Snyder et al. 1998).[35] If half of them eventually graduated, that would leave 575,500 who did not. Non-completion among transfers from community colleges, who are less likely than first-time freshmen to graduate, would increase this number somewhat (see Dougherty 1992, Pascarella and Terenzini 1991). If we take transfers into account, we would guess that over 600,000 students who enter 4-year colleges and universities each year, whether freshmen or other students, fail to graduate.

There is an extensive literature on factors in persistence in 4-year colleges, most of it reviewed in Pascarella and Terenzini (1991). Among individual factors, one of the most important for our purposes is educational achievement, a very good predictor of college graduation. High school grades and test scores are strongly related to college completion. For example, Astin et al. (1996) crosstabulated college graduation rates by high school grade and SAT score range. Without exception, the graduation rates increased with both grades and SAT scores. At the extremes, only 10.5 percent of college students with high school grade averages of C or less and SAT totals less than 700 graduated within 4 years, while 80.4 percent of students with high school grades of A or A+ and SAT scores of 1300 or more graduated in that period. Similar findings are reported in Astin et al. (1990) and Green et al. (1983).

Among the institutional factors in college graduation, an important one from our perspective is whether a high school graduate begins his or her postsecondary education at a 2-year or 4-year college. Many studies have found that controlling for demographics, personal background characteristics, motivation, aspirations, and a variety of other variables, high school graduates who enter 2-year colleges seeking a bachelor's degree are less likely to attain one than those who enter 4-year colleges. A comprehensive review by Pascarella and Terenzini (1991) cited as typical the study by Velez (1985), which found that after controlling for family socioeconomic status, gender, race, initial degree aspirations, academic ability, secondary school achievement, college grades, and place of residence, 4-year college entrants had an 18.7 percent advantage over 2-year college entrants in completing a bachelor's degree within 7 years after graduating from high school. More recently, Whitaker and Pascarella (1994) and Pascarella et al. (1998) estimated that on average, across many studies, 4-year college entrants seeking a bachelor's degree had about a 15 percent greater chance of attaining one than did similar 2-year college entrants. It is possible that there are other, unmeasured characteristics of 2-year college entrants that make them less likely than 4-year entrants to earn a bachelor's degree, but to date the evidence suggests that institutional characteristics have an impact on the probability of attaining one.[36]

In a major study, Clark (1960) argued that high dropout rates in 2-year colleges were the result of a process of "cooling out," in which many 2-year college students of modest ability were quietly diverted from 4-year college. Manski (1989), however, saw the process less as a "cooling out" than as an "experiment" in which many people enroll in community colleges knowingly to test their motivation and ability to succeed in postsecondary education. Along the same lines, Grubb (1996b) noted after studying the intentions of community college enrollees,

> Many students are there because they are unsure of their options, and the community college is the lowest-cost way of discovering the alternatives and testing their abilities.

In sum, there was a modest decline—from 3 to 7 percentage points—in completion rates and a 0 to 4 percentage point increase in dropout rates among 4-year college entrants over fixed periods between the mid-1970s and the mid-1990s. However, some of this change was due to the fact that students tend to stretch out their college experience more than they used to, taking fewer courses per semester or leaving college and returning. While the decline in retention rates has been small, the proportion of college students who fail to complete is large. We estimate that over half of 4-year college entrants, in excess of 600,000 students per year, leave without getting degrees. High school grades and test scores are among the best predictors of college completion status. Whether one initially enters a community college or a 4-year college is also a factor in persistence.

Outcomes for Noncompleters

Critics of the college movement argue that many college noncompleters do poorly in the labor market and would have been better off entering community colleges and occupational programs. This section examines economic outcomes for the more than 600,000 college entrants who do not graduate, comparing their performance with that of bachelor's degree graduates and that of noncompleters from 2-year colleges. It also compares other outcomes for noncompleters from 2- and 4-year colleges.

In assessing college outcomes, it is important to be aware of the ongoing debate about the extent to which college adds value by developing skills that the marketplace rewards and the extent to which it just "picks the winners." Human capital theory holds that college (and education in general) adds value, e.g., that the skills learned in college lead to greater productivity and greater compensation in jobs later on (for example, see Becker 1975). On the other hand, screening theory holds that colleges just select and certify more able individuals who would do as well in the labor market if they had no additional education (see Spence 1973). This process saves employers screening costs in hiring and adds to the compensation of graduates and attendees. There is an extensive literature on this debate, including controlled comparisons of college graduates and nongraduates who are similar in many respects. College graduates are generally found to earn more than similar nongraduates. However, even with statistical controls, it is possible that unobserved characteristics of college graduates, rather than their educational experience, explain the additional benefits they receive. Appendix D provides a brief review of some major research findings on the issue. We believe that both processes are at work in postsecondary education but that the human capital explanation probably accounts for more of the variation in labor market outcomes than does screening.

16

Economic Outcomes

In this section we compare the wages and other earnings of noncompleters and degree-holders with the same amount of education, and we also compare the earnings of noncompleters from 4-year and 2-year colleges with similar levels of education.

Noncompleters and graduates. It comes as no surprise that college graduates earn more than those who attend college but do not complete their programs (see Table A-1). After all, the graduates have more education. Similarly, bachelor's degree holders earn more than associate degree holders, for much the same reason (e.g., Surette 1997, Grubb 1995e, Kane and Rouse 1995b). A better question is whether college graduates earn more than attenders who have the same amount of education but no degree. Signaling theory holds that a degree's ability to certify skills and other desirable characteristics, such as perseverance, saves employers screening costs and increases the graduate's compensation. Table A-2 presents data from 6 studies that compare the wages and longer-term earnings of degree holders with those of noncompleters who have as much education but no degree. The studies are multivariate, comparing the earnings of individuals who are similar in many ways other than their college attendance and completion patterns. (Since wages are hourly earnings, we simplify the discussion by using the term "earnings" for both kinds of compensation, unless there is a need to distinguish between them.)

Across the studies examined, male bachelor's degree graduates earned more than similar noncompleters with 4 years of college credits, except in the case of vocational majors. Grubb (1995b) found that nongraduates from 4-year vocational programs earned at least as much as graduates from those programs.

For females, evidence of a bachelor's degree effect was mixed. Half of the studies reviewed showed women with bachelor's degrees earning more than women with just 4 years of college. The other half showed degree holders earning the same amount or less. As with males, Grubb (1995b) found that noncompleters from 4-year vocational programs earned as much as completers.

In the case of associate's degrees, most studies showed female graduates earning more than noncompleters with a similar number of credits. Indeed, Grubb's (1995b) SIPP analysis found female associate degree holders earning as much as or more than comparable females with 3 years of college, regardless of where the 3 years were obtained. There were exceptions to this general pattern, however. One was Kane and Rouse's (1995a, 1995b) finding that the earnings (but not the wages) of female associate degree holders were not significantly different from those of female noncompleters with two years of college. Another exception was Grubb's (1995b) finding that female graduates from academic (as distinct from vocational) programs earned less than females with just 2 years of college.

Evidence regarding the additional value of associate degrees for men was mixed. Half of the studies showed male associate degree graduates earning more than noncompleters with 2 years of college. The other half showed them earning the same amount or less.

In sum, the research shows that a bachelor's degree adds to earnings for males, and an associate's degree, for females. Other findings are complex and inconsistent across studies. However, there is some evidence that noncompleters with vocational majors do well, compared to graduates, except for females in 2-year colleges.

Noncompleters in 4-year and 2-year institutions. We turn from a comparison of graduates and noncompleters to a comparison of noncompleters from different kinds of institutions and programs. There have been a number of controlled studies that enable us to compare the economic value of a year spent at a 4-year college with the value of a year spent at a 2-year or less-than-2-year institution, for students who leave without graduating. Kane and Rouse (1993, 1995a, 1995b), Grubb (1995b), and Whitaker and Pascarella (1994) used data from the National Longitudinal Survey of 1972 (NLS72), collected 14 years after the baseline was conducted. Breneman and Nelson (1981), Anderson (1984), and Monk-Turner (1988) also used NLS72 data collected 4, 7, and 10 years after the baseline, respectively. Surette (1997) analyzed data from the National Longitudinal Survey of Youth (NLSY) collected 10 years after the 1979 baseline. In addition, Schochet (1991) examined earnings outcomes for young males collected 7 years after their initial 1979 interviews in the NLSY. He compared returns to one year and two years of "college" (whether 2-year or 4-year) with those to government training programs, military training, and off-the-job vocational training. Table A-1 shows the pertinent results from all these studies except Schochet (1991), whose data are not comparable.

In general, 4-year college students who left after acquiring a year of credits could expect to receive earnings and wages *lower than or equal to* those of similar community college students with the same number of credits. There are 2 exceptions to this generalization. First, Monk-Turner found that entrants to 4-year colleges earned significantly more than entrants to 2-year colleges. However, her study did

not compare noncompleters at 2-year colleges with noncompleters at 4-year colleges. Rather, her sample included both completers and noncompleters from both types of schools. The inclusion of bachelor degree holders in the sample may have been responsible for the significant earnings advantage of the 4-year college entrants. The second exception to the generalization is that 4-year college students who completed a year of *vocational* credits tended to do better than community college students and 4-year students with an equivalent number of *academic* credits.

A year at a 4-year college was also associated with earnings that were *lower than or equal to* those from a year at a private 2-year college. Further, Grubb's (1995b) data show that, for males, a year's attendance at a 4-year college was less valuable than a year in an academic program at a technical institute. His other estimates of earnings associated with a year at a technical institute or a proprietary school were not significantly different from the earnings associated with high school graduation.

Schochet (1991) used a choice model for young males to analyze the returns to college attendance and to participation in several forms of training. The study carefully addressed methodological questions such as possible selection biases, the role of unobserved variables, the use of Armed Forces Qualifying Test (AFQT) scores as a measure of ability, and the possible endogeneity of the training variables. Using logit and probit analyses, he estimated the returns to college attendance, off-the-job vocational training, training in government programs, and military training. With controls for ability and many other characteristics, he predicted hourly wages, salaries, and weeks worked per year separately for high graduates and dropouts, both white and black, who participated in these education and training programs.

Schochet found that across all these different estimates, participants in one-half year of training received hourly wage gains equivalent to those of similar individuals with one year of college (either 2-year or 4-year). He further found that one-half year of training yielded increases in salaries and weeks worked equivalent to those from 1–2 years of college. While these estimates seem remarkably high, Schochet emphasized that they represent short-term returns and that longer-term outcomes might be different.

The data in these studies make it clear that critics of the college movement have a point in questioning the economic value of attendance at a 4-year college for noncompleters. Students who take vocational courses in these institutions seem to do reasonably well, but others might be better off choosing a two-year institution. Even occupational training programs lasting a year or less may pay bigger dividends in the short run.

Cognitive Skill Gains

Four-year college noncompleters might have done well to consider attending 2-year colleges for another reason. Repeated tests conducted by the National Center on Postsecondary Teaching, Learning, and Assessment have shown that, when ability, time in college, and other confounding variables are controlled, 2-year college students make about the same gains in reading comprehension, mathematics, critical thinking, writing skills, and science reasoning as 4-year college students (Pascarella et al. 1998, Pascarella et al. 1995–96, Bohr et al. 1994, and Terenzini et al. 1994). In short, a year at a community college produces about the same cognitive gains as a year at a 4-year college.

Debt Burden

Critics of the college movement also argue that many college dropouts (and some graduates) are burdened with debt accumulated from student loans that could have been avoided by choosing other education and training options. Their relatively low-level jobs and earnings make it difficult to repay the debts, in this view.

Choy et al. (1997) conducted a study of postsecondary debt burden using data from the Baccalaureate and Beyond Study (B&B: 93/94) and the Beginning Postsecondary Student Longitudinal Study (BPS: 90/94). Table 3 provides data from the latter on debt burden accumulated by students who first enrolled in postsecondary institutions in 1989–90 and had either graduated or left without graduating by 1994.

Debt burden from postsecondary education, by educational attainment — **Table 3**

Degree or certificate	*% paying off debts*	*Mean $ per month owed*	*Repayment as % of salary*
No degree or certificate			
Last attended 4-yr.	19.0	75	8.6
Last attended 2-yr.	4.0	—	—
Last attended for-profit	30.0	72	9.0
Bachelor's degree	29.0	136	8.8
Associate's degree	24.1	102	9.4
Certificate	30.0	71	6.8

Source: Choy et al. (1997).

Among noncompleters, students from 4-year colleges were much more likely than those from 2-year colleges to have some debt (19 percent vs. 4 percent). However, students who left for-profit schools were the most likely to be repaying debts (30 percent).

Among completers, between 24 and 30 percent of those who received bachelor's degrees, associate's degrees, or occupational certificates had some debt. Graduates with associate's degrees were somewhat less likely than those with bachelor's degrees or certificates to have student loan debt.

Noncompleters with debts from 4-year colleges and for-profit institutions had relatively low payments each month—$75 and $72. The sample of those leaving 2-year institutions with debt was apparently too small to permit estimates of their monthly repayment amounts. Among graduates, monthly debt repayments were highest for bachelor's degree holders—$136—and lowest for certificate holders—$71. For most groups, repayment obligations were equal to about 9 percent of salary. Certificate holders were the exception, obliged to pay only 6.8 percent of salary.

Based on these data, we conclude that noncompleters from 4-year institutions are much more likely to leave school with some debt than are their counterparts from 2-year institutions. While the repayments are not large, this difference nevertheless adds weight to the critics' argument that 4-year college non-completers might have been better off attending community colleges.

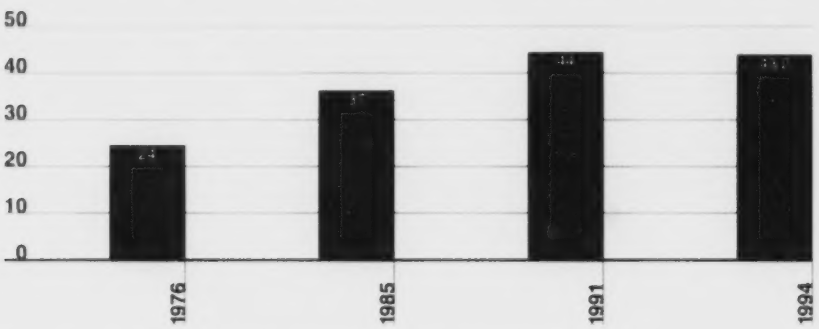
Outcomes for College Graduates

Even college graduates are not getting the expected payoff from college, according to critics of the college movement. Many find themselves in low-paying service jobs and other lines of work not traditionally associated with a college education. From this perspective, graduation no longer provides reasonable assurance of a "college-level job," e.g., a white-collar job in an organization that provides reasonable pay, good benefits, training opportunities, and the prospect of advancement at least to middle-management or mid-level professional status. We will examine first the changing occupational distribution of college graduates and then their earnings, premiums, and rates of return to investment in college.

Occupational Change

Have college graduates increasingly had to take jobs previously held by high school graduates and dropouts, as the critics contend? Let us look first at changes in the kinds of jobs college graduates get shortly after leaving college. The National Center for Education Statistics has been collecting data from new college graduates since 1976 on their experiences in the *first year* after finishing college. In four repeated surveys, the graduates were asked if their current jobs required college-level skills. Their answers to the question are graphed in figure 4.

Figure 4 **Recent college graduates saying job does not require college degree (percent)**



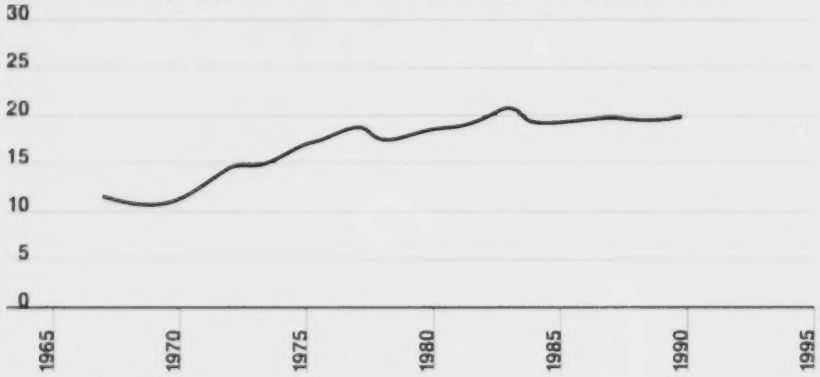
Source: Borinsky (1978), Korb (1987), Calahan et al. (1991), McCormick et al. (1996).

The proportion of graduates saying that their job did not require college-level skills increased from 24 percent in 1976 to 44 percent in 1991 and remained at that level in 1994. The largest part of the increase (13 of 20 percentage points) occurred between 1976 and 1985. Of course, the data are subjective, but the fact that the question and the methods remained essentially the same over time provides some confidence that the graduates' opinions reflect real changes. We should keep in mind, though, that these are young college graduates in the first year after leaving college. The job market for young college graduates is quite volatile and is different from the market for older graduates. As we shall see, objective data on older college graduates tell a similar story, though one in which the changes are less dramatic.

Freeman (1976) and Freeman and McCarthy (1982) were among the first to observe that the proportion of college graduates in professional jobs declined from the late 1950s and the 1960s to the early 1970s. The latter study also found no increase in this proportion (for males) or a further moderate decrease (for females) as of 1979.

In a more detailed study, Hecker (1992) reported that the numbers of college graduates (including those with advanced degrees) age 25 and older in what he termed "non-college jobs " increased substantially from 1967 to 1990. Using Current Population Survey data, Hecker defined non-college occupations as those in the retail sales; administrative support; service; precision production, craft, and repair; operator, fabricator, and laborer; and farm categories. He excluded occupations in these categories that might reasonably require college-graduate skills, such as farm manager and craftworker supervisor. Based on Hecker's data, figure 5 shows the changing proportions of college graduates in non-college jobs over this period.

Percent of college graduates 25–64 in "non-college" jobs, 1967–1990 **Figure 5**



Source: Hecker (1992).

Among male and female college graduates age 25 and older, Hecker found that the proportion in non-college jobs increased from around 11 percent in the late 1960s to around 20 percent in the late 1980s. Most of this change—8 percentage points—occurred between 1968 and 1977. During the 1970s, Hecker argued, an excessive supply of college graduates forced many into non-college jobs and drove the college premium down. The greatest increases in these lower-level jobs held by graduates were in sales and service work. Hecker also found that the college premium increased sharply in the 1980s across all occupations and *within* occupational categories. College graduates in the same types of occupations as high school graduates not only earned more, but their earnings advantage was increasing.

Hecker addressed the apparent paradox that both college premiums and the proportion of college graduates in non-college jobs had increased.[37] He considered and rejected the argument that larger numbers of graduates were of low ability and did not qualify for "college-level" jobs. Instead, he argued that there continued to be an oversupply of college graduates relative to the number of college jobs. College graduates were therefore displacing high school graduates in non-college jobs. High school graduates had to take lower-paying jobs, in part because they were being bumped and in part because high-paying jobs in manufacturing and mining were disappearing.[38] The college premium was

increasing not because college graduates were earning more, but because high school graduates were earning less. Hecker therefore argued against any measures to further increase the supply of college graduates.

Tyler et al. (1995) took issue with Hecker's analysis, using the Census Public Use Microdata Samples for 1979 and 1989. For purposes of comparison, the authors accepted Hecker's definition of non-college jobs. Unlike Hecker, they defined college graduates as those with only 4 years of college or a bachelor's degree, not those with a bachelor's degree or higher. They agreed that an oversupply of college graduates in the 1970s had caused many to take non-college jobs and had driven down the college wage premium. However, they argued that current decisions about college should be based on recent labor market information pertaining to younger college graduates. The authors noted that most of the occupational change Hecker found occurred in the 1970s (i.e., 8 percentage points out of a 9-point increase). After about 1980, there was no marked increase in the proportion of college graduates in non-college jobs.[39] (Nor was there any marked decrease.)

Controlling for the age and sex of graduates, Tyler et al. found no increase between 1979 and 1989 in the proportion of younger men and women (25–34), and older women (45–54) in non-college jobs. Only the older men experienced an increase in this period. Like Hecker, Tyler and his associates reported that college graduates earned more than high school graduates in the same occupational categories. Like Hecker, they also found that the college premium was *increasing* within occupations, as well across all workers. The authors noted that the economy had successfully absorbed a 60 percent increase in the labor supply of college graduates in the 1980s. Since the number of people in the 25–34 year old age cohort was expected to *decrease* 17 percent between 1991 and 2001, they saw no possibility that a large enough proportion of young people would graduate from college to match the 60 percent growth in the labor supply of young college graduates in the 1980s.

Pryor and Schaffer (1997) used a different definition of non-college jobs but came to conclusions similar to those of Tyler et al. Examining the occupations and earnings of "prime-age" workers 25 through 49 years old, they classified occupations using the average education level of these workers in 1971 and 1972. Like Hecker and Tyler et al., they found a substantial increase in the proportion of college graduates in "high school" or "non-university" jobs between 1971 and 1979, but less marked, or marginal, changes between 1979 and 1995. In a finding similar to that of Tyler et al., Pryor and Schaffer reported that the percentages improved between 1987 and 1995 for all age/sex groups except older men (age 45–54).[40] Their data also showed that that college graduates earned more than high school graduate workers in non-university jobs and that the college premium in those jobs had increased over the years.

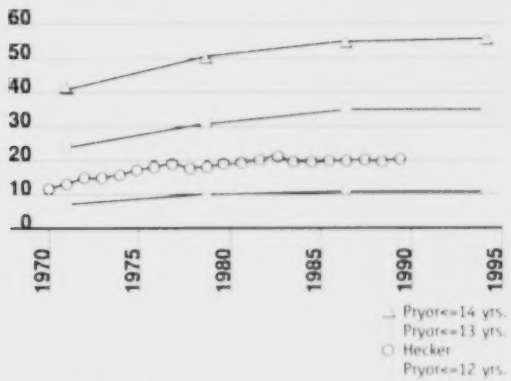
Despite the differences among Hecker, Tyler et al., and Pryor and Schaffer, their estimates of changes in the distribution of jobs held by college graduates are fairly consistent, and it is possible to draw some general conclusions from them. Figures 6a–6f show the changing proportions of college graduates in "non-college " jobs over time in the three different studies for males and females of different ages.

The figures show several things. First, there was a marked increase in the proportion of college graduates in non-college jobs in the 1970s and into the 1980s, except among older women. Second, there was no additional increase after the mid-80s, except among older men. Third, by the mid-1990s, the

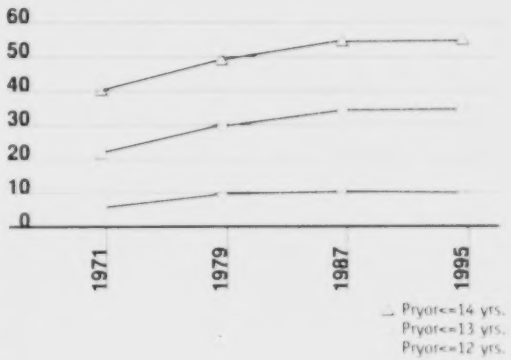
proportions had not returned to their 1970 levels, though the rates for younger men and women showed a tendency to decline.

Percent college graduates in non-college jobs, by age and education level of job **Figures 6a – 6f**

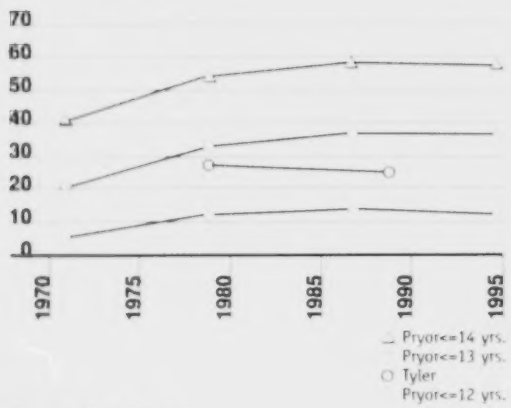
6a—*all ages*



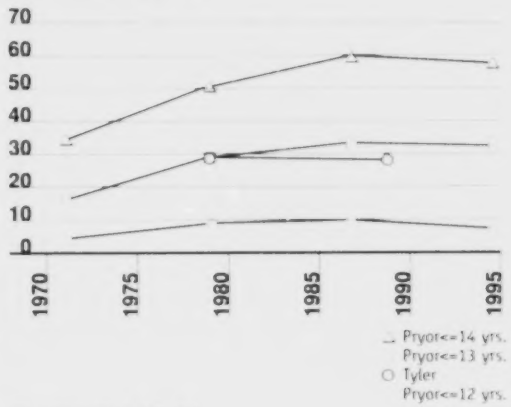
6b—*25–49*



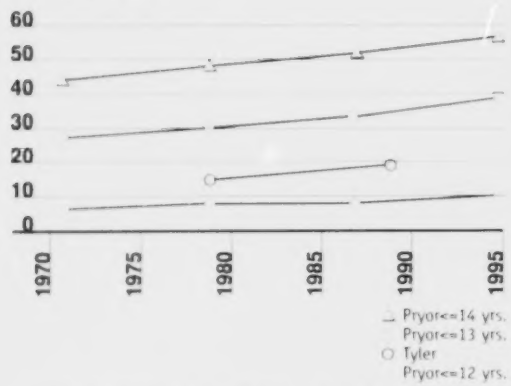
6c—*males 25–34*



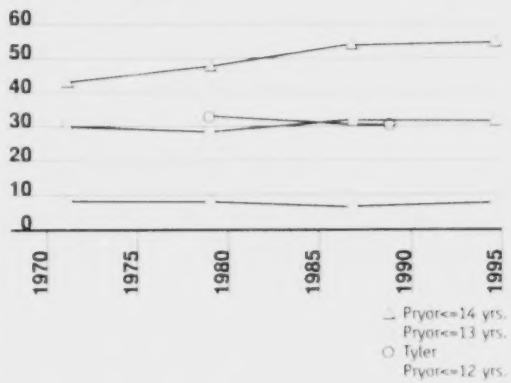
6d—*females 25–34*



6e—*males 45–54*



6f—*females 45–54*



Source: Hecker (1992), Tyler et al. (1995), Pryor & Schaffer (1997).

Data drawn from Pryor and Schaffer provide some insight into factors related to the change in the types of jobs held by college graduates. As noted earlier, the authors classified occupations by the mean education level of their incumbents in 1971 and 1972. Level 1 occupations were those in which workers had a mean education equal to or less than 10.5 years. The corresponding mean for Level 2 was 10.6–12.0 years; Level 3, 12.1–14.5 years; and Level 4, equal to or greater then 14.6 years. Table 4 shows the percentage of college graduates in each category in 1970 and 1994; premiums within categories in 1974, 1978, 1986, and 1994; and the average literacy score for college graduates within categories in 1992.

Table 4 **Proportion of college graduates by job level for prime-age workers in 1970 and 1994; premiums by job level for 1974, 1978, 1986, and 1994; and adult literacy scores by job level, 1992**

Job level	Level 1	Level 2	Level 3	Level 4	All
	<=10.5	*10.6–12.0*	*12.1–14.5*	*>=14.6*	
Proportion of BAs at each level					
1970	.012	.045	.346	.597	1.00
1994	.029	.066	.455	.450	1.00
Change	.017	.021	.109	-.147	
College premiums					
1970	*	.23	.61	.29	
1978	*	.04	.57	.51	
1986	*	.16	.64	.62	
1994	*	.33	.80	.74	
change 1970–94**		.47	.30	1.58	
Mean literacy scores of graduates (1992)	*	316	331	340	333

*Sample numbers too small to permit estimates.
**Difference (1994-1974)/1974
Source: Pryor and Schaffer (1997).

Between 1970 and 1994 there was a net shift of 14.7 percent of college graduates from college-level jobs—those with mean education levels at or above 14.6 years—into non-college jobs, based on the 1971–72 definition. Most of this shift (10.9 percent) was into jobs typically requiring a year or two of college (12.1 to 14.5 years of education). The proportion of college graduates in the lowest 2 job levels (high school graduate or less) increased only 3.8 percent, from 5.8 to 9.6 percent. By 1994, about one-tenth of the college graduates were in jobs that had a mean education level of 12 years or less in the early 1970s. Nine-tenths of college graduates were in jobs that typically required some college or a college degree, based on the 1971–72 definition .

Pryor and Schaffer used the National Adult Literacy Survey (NALS) scores of college graduates to assess the relation between their literacy skills in 1992 and the education levels of the jobs they held. The authors found that college graduates with lower NALS scores were more likely to take non-college jobs than their higher-scoring counterparts. (Bishop 1997 reported similar findings.) The scores of prime-age college graduates in Level 2, 3, and 4 jobs were 316, 331, and 340 respectively. These are real, but not large, differences. The mean NALS score for all college graduates in this age range was 333—about the same as that of college graduates in Level 3 ("some-college") jobs. The graduates in Level 2 occupations had a score 17 points below the mean, while those in Level 4 occupations had a score just

7 points above it. In contrast, workers with only a high school diploma had a mean NALS score of 279—37 points lower than that of college graduates in Level 2 occupations (mean education level 10.6-12.0 years) and 52 points lower than that of college graduates in Level 3 occupations (12.1-14.5 years). Although direct comparisons of the scores of college graduates and high school graduates at the same occupation levels are not available, the data strongly suggest that college graduates bring much better literacy skills to their jobs (regardless of level) than do high school graduates.

Differences between the literacy skills of high school graduates and college graduates in the same broad occupational categories may contribute to the wage premiums that the latter receive. In 1994, college graduates in Level 2 jobs earned 33 percent more than high school graduates. This represented a premium increase of 47 percent since 1970. In Level 3 jobs, college graduates earned 80 percent more than high school graduates, an increase of 30 percent. And in Level 4 jobs, college graduates had a 74 percent advantage, a remarkable 158 percent increase from 1974.

In all, the occupational data show that between 1970 and the early 1990s there was a shift of college graduates out of "college jobs" and into "non-college" jobs. Most of this shift occurred in the 1970s. After that, there was little increase in this proportion for younger college graduates, and they saw the proportion begin to decline in the 1990s. Only older male graduates continued to move into non-college jobs at an increasing rate. Most of the shift was into jobs that had typically required 1 or 2 years of college in the early 1970s. In 1992, college graduates in these jobs had literacy levels that were about the same as the average for all college graduates and much higher than the average for high school graduates. Moreover, they earned more than high school graduates, and their earnings advantage increased over the years.

While it's clear that there has been a shift in the distribution of college graduates across occupations over the last several decades, it is not clear that great numbers of graduates are wasting their time in jobs that do not require their skills—i.e., that they are "overeducated" or "underemployed." If they were, why would employers be willing to pay them more than high school graduates in similar jobs? And why would this premium be increasing over time?

If we were to assume that the skill levels typically required by occupations had not changed since the early 1970s, we might reasonably conclude that the movement of college graduates into "non-college" jobs constituted overeducation. But the best evidence is to the contrary. Rising college premiums, which are found within all major industries, reflect an increasing demand for skills, and much of that growth in demand is the result of technological change, prominently including the expansion of computer and information technology (see the section in this synthesis entitled *The Value of a College Degree in Perspective*). Thus, the skill requirements of many "non-college" jobs have increased, turning them into "college-level" jobs.[41] Though skill requirements of jobs are higher today than they were in the 1970s, however, we do not know whether this increase accounts for all of the shift of college graduates into a wider range of occupations. Other factors may be involved.

Economic Benefits

Some critics of the college movement contend that many college graduates receive very limited economic benefits from their investment in college. The critiques we reviewed were not very specific about how many college graduates were doing poorly, which benefits were limited, the extent of the limitation, or how benefits had changed over time (for example, see Stanfield 1997, Gray and Herr 1996). They seemed to hark back to the "overeducation" literature of the 1970s and 1980s. In

assessing benefits, we will focus on college graduate earnings in several forms—real earnings (adjusted for inflation), college premiums (earnings compared to those of high school graduates), and internal rates of return (earnings compared to the cost of college).

Earnings are a major determinant of economic well-being and have been measured systematically for years with high levels of reliability and validity. However, they are only one measure of economic benefits. Earnings make up just part of the total compensation workers receive, which also may include fringe benefits such as health care, retirement, and vacations and other rewards such as stock or stock options. Compensation, in turn, is part of total income, which may include other things such as interest, dividends, and rent.

These outcomes are still only part of the benefits picture. Researchers have identified a wide range of individual benefits associated with higher education. In a review of the literature, Leslie (1990) included the following among the documented benefits of higher education:

- Increased earnings
- Greater fringe benefits
- Better working conditions
- Better ability to select appropriate savings instruments
- Better health and longer life
- Lower disability rates
- Fewer unwanted children
- Better health for offspring
- Tendency to select spouses with higher earnings potential
- Tendency to make more informed purchases
- Tendency to raise children in ways that enhance formal schooling effects
- Increased chances that children will attend college

As noted earlier, we do not know to what extent a given outcome is the result of college and to what extent it derives from the prior characteristics of those who complete college. However, based on our reading of the research literature, we believe that the college experience probably accounts for more of the difference between the benefits of college graduates and those of high school graduates than do prior characteristics.

Focusing on one of the outcomes in the list above, fringe benefits, Leslie (1990) noted Psacharopoulos' estimate that monetary rates of return to higher education based on earnings increased by about 20 percent when just the value of vacations and holidays was taken into account.

In addition, many of the nonmarket outcomes of higher education have monetary value. For example, better health, longer life, and lower disability rates can result in increased lifetime earnings. Higher spousal earnings and better savings and investment practices can result in increased family income. Fewer unwanted children and more informed purchases can result in higher disposable income. Several studies have attempted to calculate the value of the nonmarket benefits of higher education. Becker (1975) and Haveman and Wolfe (1984) estimated that including such benefits would double the rates of return to higher education typically based on earnings. Jorgeson and Fraumeni (1989) arrived at

even larger estimates. They concluded that nonmarket benefits by themselves were worth about twice the value of market benefits for men and about five times the value for women.

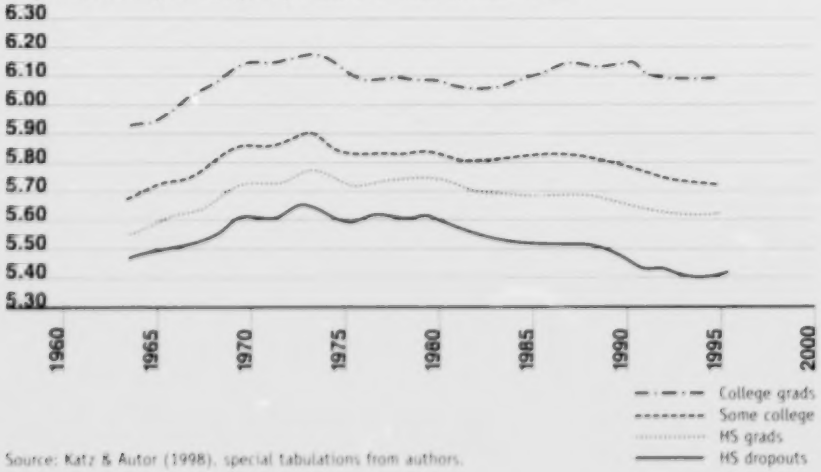
Though limited as a measure of the total benefits of education, earnings are a reliable means of tracking changes in compensation over time and of comparing the monetary benefits of different types of education.

The Real Earnings of College Graduates

Real earnings are actual or current earnings adjusted for changes over time in the cost of living. There are many estimates of temporal changes in real earnings, based on the Bureau of Labor Statistics' Current Population Survey (CPS), decennial Census data, and other sources. Until recently, these estimates tended to overstate the decline in adjusted earnings since the early 1970s, because they used the Consumer Price Index (CPI) to deflate current earnings. The CPI overestimated inflation, especially in the late 1970s, and calculations of real earnings that used the CPI as a deflator compounded the downward error in estimates over successive years. Recently, the CPI-X and the Personal Consumer Expenditures (PCE) deflators have been developed to correct the errors in the CPI. (Estimates of earnings by education level over time using the CPI deflator can be found in appendix figures B-2 and B-3.)

One of the best recent estimates of changes in real earnings by education level is that of Katz and Autor (1998). The authors relied on March CPS data to calculate log mean weekly earnings from 1963 to 1995. Using a sample of full-time, full-year wage and salary workers age 19 to 65, they estimated earnings for 64 groups defined by education, potential experience (age), and sex. To prevent demographic changes from confounding changes in earnings by education level, they used fixed weights in computing means for broader groups over time. To control for the effects of inflation, they used the PCE deflator. Figure 7 shows Katz and Autor's estimates of log mean weekly earnings from 1963 to 1995 for college graduates, those with some college, high school graduates, and high school dropouts.

Log real weekly earnings by education level, 1963–1995 — **Figure 7**



Source: Katz & Autor (1998), special tabulations from authors.

Real weekly earnings for all groups rose in the 1960s, peaking in 1973. Then the earnings of all groups fell. Those of college graduates bottomed out in 1981 and started rising (but did not quite return to

the 1973 level). The earnings of high school graduates continued to fall, and those of high school dropouts fell even faster. Over the period 1973–1995, college graduates experienced a net loss of 9 percent. However, high school graduates lost 17 percent and dropouts, 24 percent. While workers with some college earned more than high school graduates, they lost a little more—20 percent—over this period.

CPS data for 1995–97 show the weekly earnings of college graduates age 25 and older holding fairly steady at 1994 levels.[42] However, in Spring 1998, the real wages of workers began rising (*Washington Post*, May 2, 1998). Though breakdowns by education level are not yet available, Mishel et al. (1998) found that the hourly wages of workers in the top tenth of the distribution increased 2.6 percent between 1996 and mid-1998, and those of workers in the bottom fifth rose even more—3.6 percent. The authors attribute this narrowing of the wage gap to low unemployment, low inflation, and a higher minimum wage.

College Premiums

College premiums reflect the percentage increase in the earnings of college graduates compared to those of high school graduates. While earnings tell us about purchasing power, premiums indicate how much more college graduates earn than their high school counterparts, in relative terms. If college graduates earned no more than high school graduates, the incentive to attend college would be greatly reduced.

We examined 19 studies that estimated college premiums over time in the period 1960–1997. Appendix table A-3 lists the studies, describes some of their key features, and indicates the year of the lowest premium in this period.[43] As a rule, these studies showed a premium decline in the 1970s, followed by a rapid rise to new highs in the 1980s. There is little disagreement among economists about this basic pattern.

One of the best summaries of college premiums over the period in question is (again) that of Katz and Autor (1998). As we saw in the previous section, they used CPS data and the PCE deflator to calculate log mean weekly earnings (1963–1995) for full-time year-round workers age 19 to 65. In estimating wages by education level, they controlled for sex and experience and used fixed weights to adjust for

Figure 8 **Log college wage premium, 1963–1995**

Source: Katz & Autor (1998), special tabulations from authors.

changes in the demographic composition of the workforce. Figure 8 shows how the premiums of all college graduates and those with 5 years' experience changed over this period.

Premiums rose moderately in the 1960s, reaching peaks in the late 1960s and early 1970s. Then they fell 8–10 percentage points to lows in the late 1970s. Thereafter, premiums increased sharply, tapering off in the later 1980s at levels well above their previous high (in this period). As of 1995, college graduate workers in general had exceeded their previous high by 9 percentage points, and the more recent college graduates had exceeded theirs by 15 percentage points.

Figure 8 also shows that through the 1970s, the premiums of the more recent college graduates were a little lower than those of all graduates in the sample. However, the pattern reversed itself between 1981 and 1982. After that, college graduates with 5 years experience had higher premiums than did all graduates. At least 2 other studies (Lydon 1989 and Murphy & Welch 1989) showed or suggested a similar reversal. However, another study, by Gottschalk (1997), reported that less experienced college graduates had higher premiums throughout most of the period between the mid-1960s and the mid-1990s (see figure B-4). Though it is not clear what accounts for this difference in the studies, it is clear that by the 1980s the earnings advantage of younger college graduates vis-à-vis high school graduates was greater than that of college graduates in general. One reason for this advantage may be that a larger premium is paid for the newer skills that young graduates bring with them from college.

Internal Rates of Return to College

While college premiums indicate how much college graduates earn relative to high school graduates, they don't necessarily tell us whether a college degree is a good investment. To know that, we need to assess the benefits of a college degree in relation to the costs. The internal rate of return (IROR) is a way of calculating the economic benefits of education—in this case the college premium—in relation to the costs. Typically the IROR of a college degree is the difference between the additional dollar cost and the additional dollar benefit of college (over those of high school completion), expressed as a percentage of the cost. Both costs and benefits are calculated over the course of one's working life.[44] IROR studies calculate both private and social rates of return.

Private returns reflect the costs and benefits of additional education to the individual. The costs of college include tuition, fees, and the costs of room, board, and other expenses above what would ordinarily be incurred if one were not going to college. The biggest cost to the individual, however, is foregone earnings—the money one would have earned over the college years had he or she been working instead of going to school. The lifetime value of college costs is the original cost of college, plus compound interest over one's working lifetime, adjusted for inflation. The economic benefits are post-tax lifetime earnings. Lifetime costs and earnings have to be estimated, and the estimates are very sensitive to assumptions, such as the interest rates used in calculating them and the assumed rate of earnings gains over time.

Social returns differ from private returns in that they include all the costs colleges incur in educating students, not just costs to the individual, and economic benefits are measured by pre-tax lifetime earnings. Thus the calculation of social returns includes government subsidies to colleges and the additional tax revenues that governments receive from college graduates. College also yields nonmarket benefits to society, just as it does to individuals. Such benefits may include higher rates of civic and political participation, lower crime rates, and lower rates of public transfer payment receipt among college graduates than among similar individuals with less education.

We examined 17 studies of private returns to college and 13 studies of social returns (see Tables A-4 and A-5). In developing this list, we drew upon Leslie and Brinkman's (1988) comprehensive review, adding more recent studies and others based on systematic national data. We excluded studies reviewed by Leslie and Brinkman that were not based on representative national samples, did not have results for 4-year college graduates, or had serious methodological flaws. These included studies of graduates from one institution (e.g., Illinois State University, Pan American University); studies of one type of graduate (e.g., Air Cadets, Woodrow Wilson Fellows); studies reporting results only for college attenders or graduate degree holders; and studies that Leslie and Brinkman found questionable on methodological grounds.

Calculating a mean rate of return for each author in our lists and then computing grand means, we find that the average private rate of return across studies is 11.8 percent and the average social return, 11.6 percent. The mean private return is the same as Leslie and Brinkman's, though the mean social return is at the low end of their range (11.6 to 12.1 percent).

Alsalam and Conley (1995), Psacharopoulos (1994), and others have observed that private rates of return are usually higher than social rates. The social costs of education are much greater than private costs, while social earnings gains are only moderately greater than private gains. The means we calculated also suggest that private rates are higher, but the comparison could be biased, because rates of return vary greatly across studies, and the list of studies estimating private returns (Table A-4) is not the same as the list estimating social returns (Table A-5). If we control for methodological differences across studies by examining only those that estimate both private and social rates of return (Table A-6), we find that in almost every case the private rates are higher. The mean private rate across these studies is 14.2 percent and the mean social rate, 11.4 percent.

Have rates of return to college changed over the years? Table 5 lists studies that calculated internal rates of return—private and social—for the 1970s. The table indicates the average rate of return in

Table 5 **Internal rates of return to 4-year college**

	Pre-1970 mean	Lowest rate	Year(s) of low	1980+ mean
Private IRORs				
Freeman (1975)	11.3	8.5	1974	—
Freeman (1977)	12.0	8.5	1973	—
Psacharopoulos (1980)	8.6	4.8	1974	—
Witmer (1983)	15.0	15.0	1961–62	16.5
Social IRORs				
Cohn & Hughes (1994)	15.1	10.5	1974	17.7
Freeman (1975)	10.8	7.5	1974	
Freeman (1977)	12.5	9.5	1973	
Liberman (1979)	13.9	12.1	1973	
McMahon (1991)	9.0	8.0	1973, 77, 78	11.1
Witmer (1980)	13.8	13.1	1968	
Witmer (1983)	13.8	12.4	1971–72	13.5

Source: Studies in table.

each study for the years before 1970, the lowest rate of return, the years of the lowest rates, and, for 4 studies, the average rate of return for years in the 1980s.

The data in these studies are largely consistent with the pattern we saw for college premiums—a decline in the 1970s, followed by a recovery and increase to levels exceeding those prior to 1970. Among the studies of private returns, all but one (Witmer 1983) reported the lowest IROR in 1973 or 1974. Among the studies of social returns, all but one (Witmer 1980) also found the lowest rates in the 1970s, especially 1973 and 1974. Of the four studies that calculated rates of return for years 1980 and after, three showed post-1980 means exceeding the pre-1970 means. The exception was again Witmer (1983). The atypical nature of Witmer's rates may be due in part to the fact that his sample was made up of all college graduates with four *or more* years of education. Unlike the other studies, it included individuals with postgraduate education. Changes over time in the rates of return for these individuals may have been different from changes in the rates for those whose highest level of education was a bachelor's degree.

Is college a good investment for those who graduate, as judged by internal rates of return? An IROR of around 12 percent compares favorably with other investments. For example, returns in the stock market have historically averaged around 11 percent. However, unlike internal rates of return, stock market rates are nominal returns that do not take inflation into account. Over the last 50 years, inflation has increased at an annual rate of 5–6 percent. Deflating nominal stock market returns brings the real rates down to around 5 or 6 percent, much less than the return to college. If we further consider that the monetary value of all the benefits of college (earnings, other monetary benefits, and nonmonetary benefits) is at least twice the value of the internal rate of return, college looks like a very good investment for those who graduate.

Other variations in returns. Other variations in returns to higher education have been summarized in a number of studies (e.g., Pascarella and Terenzini 1991, Leslie and Brinkman 1988, Alsalam and Conley, 1995). Information about two variations may be especially useful in providing guidance to young people facing decisions about college. The first has to do with differences in returns to college majors and the second, with differences in returns to the quality of the school attended.

Concerning the first, Pascarella and Terenzini cited 16 controlled studies showing that in the short run, returns to undergraduate business and engineering majors were relatively high, while those to humanities and social sciences were relatively low.[45] Most of these studies examined earnings within the first 10 years of graduation. Evidence of variation in returns over the longer term is sparse, but the authors cited 3 studies showing that, within certain companies, humanities and social science majors earned as much as graduates of business and engineering programs, or more, later in their careers. Obviously, however, one cannot generalize from three case studies.

The second finding has to do with college quality. Pascarella and Terenzini (1991) found 15 controlled studies showing that the quality of postsecondary institutions, especially as measured by selectivity, had a small but significant effect on later earnings, net of other factors. Most of the effect came from colleges in the top fifth or quarter of the quality distribution.

Human capital studies conducted in countries around the world provide other useful information about returns to education (including but not limited to higher education). The following points are taken from a summary in Alsalam and Conley (1995).

First, for younger people at least, the earnings gained from education are generally greater than the earnings lost by foregoing work in order to attend school. For example, in 12 European countries, earnings increased an average of 5.2 percent for each additional year of schooling. The earnings gain due to an additional year of work experience was only about one-half of that, on average. The value of foregoing earnings in order to acquire additional education and training is one of the fundamentals of human capital theory.

Second, returns diminish with level of education. On average, returns to elementary education are relatively high, while those to graduate school are relatively low. These differences are largely a function of costs. For the individual, elementary schooling is very inexpensive, especially because foregone earnings are minimal. Graduate education, on the other hand, is very expensive, in part because the student forgoes earnings equivalent to those of a college graduate. At the societal level too, costs (e.g., public subsidies) tend to increase with level of education. The diminishing returns to investment in higher levels of education have major implications for governments—especially in developing countries—that must make decisions about the allocation of funds among different levels of education. The diminishing returns also affect individuals' decisions about whether or not to invest in the next level of education. At some point, further investment will no longer be worthwhile. However, as we have seen, the returns to attainment of a college degree generally justify the expenditure.

Third, returns to education are higher for women than for men. As Alsalam and Conley (1995) observe, this does not mean that women's earnings are higher but that their increase in earnings, relative to the cost of education, is greater. The relatively large increase in women's lifetime earnings may reflect the fact that women's labor force participation rates increase, relative to those of men, with more education.

The Value of a College Degree in Perspective

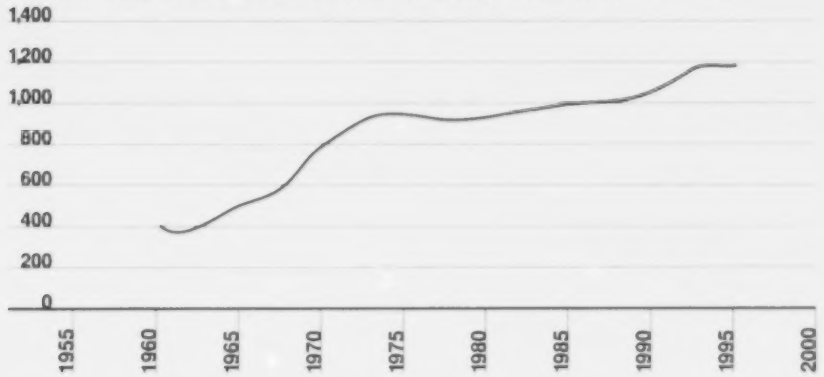
The changing relative value of a bachelor's degree is a central feature of the large and rapidly expanding literature on wage inequality. Inequality between high- and low-wage workers has grown markedly since the 1970s, and a key manifestation of this change is the rising college premium. Often the inequality that the literature describes and attempts to explain is the difference between the wages of college graduates and those of high school graduates.[46]

This literature has recently been reviewed and summarized by Katz and Autor (1998) and by several authors in the Spring 1997 edition of the *Journal of Economic Perspectives*. The following discussion is guided by these reviews, although it also draws upon other studies and data sets. The reviews use a supply and demand framework to explain the growth of inequality.[47]

Economists generally agree that the last several decades have seen a strong, long-term increase in the demand for skills, including those acquired through formal education.[48] Against this background, there have been decade-to-decade fluctuations in the supply of skills, especially those of college graduates. The drop in the college premium in the 1970s is usually explained by changes in supply, while explanations of the rapid growth of premiums in the 1980s tend to focus on changes in demand.

The 1970s Premium Decline. There is a consensus among economists that the decline in the value of a college degree in the 1970s was due primarily to a rapid rise in the supply of college graduates in the late 1960s and early 1970s (Katz and Autor 1998, Johnson 1997, Topel 1997, Murphy and Welch 1989). Using NCES data,[49] we found that in the 7 years between 1967 and 1974, the number of new college graduates increased 69 percent, an average annual rate of 10 percent (figure 9). Then growth abated.

Bachelor's degrees awarded at 4-year colleges, 1960–1995 *(in thousands)* **Figure 9**

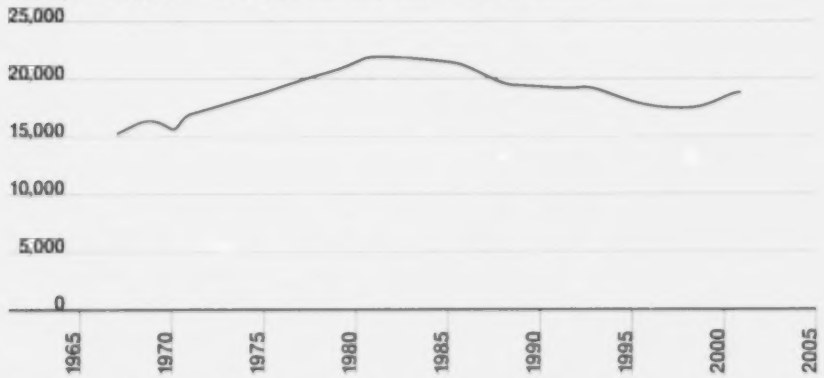


Source: Snyder et al. (1997).

Over the 15-year period between 1974 and 1989, the number of new bachelor's degrees increased 8 percent, an average annual rate of just one-half percent. After 1989, the rate of increase picked up again. In the 5 years between 1990 and 1995 the number of new college graduates grew by 15 percent, or an average of 3 percent a year.

The 1960s and 1970s also saw the baby boomers' emergence into adulthood. Figure 10, based on Census data,[50] shows that the number of 20–24-year-olds increased over this period, peaking in 1981.

Young adult population, ages 20–24, 1967–2001 *(in thousands)* **Figure 10**



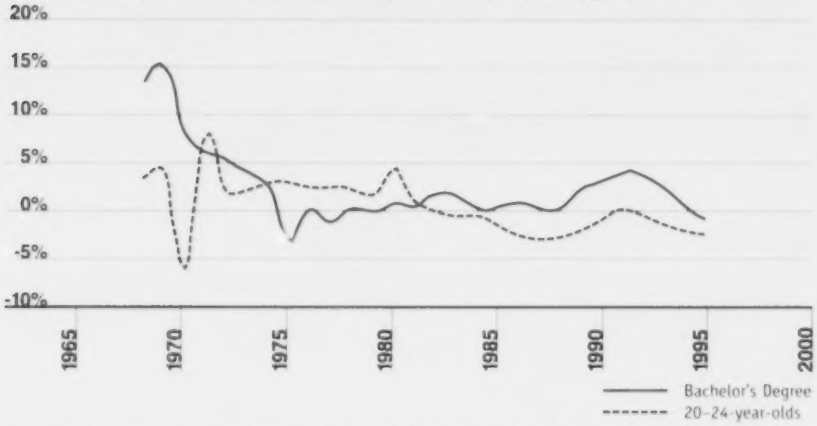
Source: Bureau of the Census.

The baby-boom increase in new workers tended to reduce wages generally, and the glut of new college graduates depressed their wages especially. The problems of new college graduates were exacerbated by the fact that they were less likely to be substituted for their older, more experienced counterparts than

young high school graduates were for their older counterparts (Smith and Welch 1978, Murphy and Welch 1989). Thus, young college graduates were more likely to be restricted to entry-level jobs.

Throughout most of the period between the late 1960s and the mid-1990s, the percentage change in the number of new bachelor's degrees reflected the change in the size of the college age cohort fairly closely (figure 11). In the late 1960s and in 1970, however, the number of new college graduates grew much more rapidly than the age cohort (which for some reason experienced negative growth in 1970).

Figure 11 **Annual change in new bachelor's degrees and persons age 20–24**



Source: Snyder and Bureau of the Census (1974, 1982, 1992, 1993a, 1993b, 1993c, 1996).

What caused the disproportionate rise in the supply of college graduates in the late 1960s and in 1970? One explanation is that high school graduates were responding to the attractive premiums of the 1960s by enrolling in college in large numbers. There is considerable evidence that new college enrollments are sensitive to premium changes, as market economics would lead us to expect (Topel 1997). The high premiums of the 1960s no doubt played a role in increasing college enrollments. But the growth of enrollments was larger than the premiums would lead us to expect.

Another explanation is the wave of draft-motivated college enrollments that occurred during the Vietnam War (Katz and Autor 1998, Johnson 1997). The desire for draft deferments provided a powerful incentive for attending college. Data from Topel's (1997) analysis of college enrollments in Sweden and the United States illustrate this phenomenon.[51] While male college enrollments in Sweden tracked premiums fairly closely in the 1960s and 1970s, enrollments in the United States started growing much faster than premiums in 1965, when the U.S. military commitment in Vietnam increased dramatically. College deferments ended with the introduction of the draft lottery in 1969, but those already in college were allowed to stay. Hence, college enrollments remained high until around 1973, after which they began to fall more rapidly than college premiums. In effect, the draft provided a major nonmarket incentive for college enrollment.

The 1980s Premium Increase. There is general agreement that the increased supply of college graduates and the reduced college premiums in the 1970s were a temporary phenomenon. Katz and Autor (1998) called the 1970s the "outlier decade" (also see Johnson 1997, Topel 1997, Murphy and Welch 1989). By the 1980s, college premiums, which had been going up in the 1950s and 1960s, were again

on the rise. Some of the growth in the 1980s was due to the deceleration in the rate of increase in the supply of new graduates, which we saw above in figures 9 and 11 (also see Topel 1997, Katz and Autor 1998, and Johnson 1997). However, the number of college graduates was still growing, and premiums were rising very rapidly, despite increased supply. (At the same time, the relative wages of high school graduate workers were going down, even as their numbers decreased.) Increased demand for skills was probably a major factor in the 1980s rise in premiums.

Katz and Murphy (1992) estimated that a little less than half of the 1980s increase in the college premium was due to reduced supply growth and the remainder, to increased demand. Other economists gave more emphasis to demand. Johnson (1997) estimated that between 1979 and 1989 relative demand grew 60 percent while relative supply grew 31 percent. He further observed that "[the] literature reaches virtually unanimous agreement that during the 1980s relative demand increased for workers at the higher end of the skill distribution and thus caused their relative wages to increase."[52] Topel (1997) concluded that "the weight of empirical evidence is that [rising wage inequality] is demand-driven, emanating from the technical changes that have favored skilled labor in production. The skill composition of the American workforce has also improved over time, but to date this increase in the supply of skills has not kept pace with rising demand."[53]

There is also an emerging consensus that while the 1980s saw a substantial increase in the demand for skills, demand had been growing over a much longer period. Katz and Autor (1998), Topel (1997), and Johnson (1997) found it increasing 40 or 50 years ago. Goldin and Katz (1998, 1995) date the increase from early in the century. Whether there was an acceleration in the growth of demand for skills in the 1980s is less clear. Katz and Autor (1998) found "a rather smooth increase in the relative demand for more educated workers" over the last few decades, with "some acceleration in demand shifts favoring the more educated in the 1980s" (also see Autor, Katz, and Kreuger 1998). Johnson (1997) observed that demand had been growing fairly consistently for at least 40 years and that the increase in the 1980s represented only a "slight acceleration of a long-term trend." In this perspective, the increased supply of college graduates in the late 1960s and early 1970s temporarily interrupted the long-term demand-driven increase in the college premium.[54]

The two major explanations for the rise in wage inequality focus respectively on increased demand for high skills and decreased demand for low skills. The first explanation is that the growth of technology, and especially computer technology, raised the skill levels required in jobs throughout the labor market and hence increased the demand for abilities such as those of college graduates. The second is that the emergence of a global economy reduced the demand for unskilled and semi-skilled labor in the United States (and other developed countries) by making a plentiful supply available in developing countries. Manufacturing jobs went abroad, leaving mainly low-paying service jobs behind for the less skilled.

With regard to the first explanation, there is substantial agreement among economists that technological change has been a key factor in the increased demand for skilled labor. In Topel's (1997) words, "with few exceptions, the consensus in the literature is that technical change favoring high-skill workers has been an ongoing force toward rising inequality in developed economies, at least for the last 25 years."[55] Technology in this context includes not just equipment, but all the systematic ways in which things are produced and services provided e.g., both computers and quality assurance systems. Technological change can have varying effects on the earnings distribution, depending in part on its differential impact on the labor productivity of workers (Johnson 1997). It can increase the productivi-

ty of the unskilled, as it did with the introduction of the assembly line, which favored unskilled workers over craftsmen and artisans. It can be neutral, affecting different skill groups about equally. Or it can be (positively) skill-biased, favoring more skilled workers, such as college graduates. The majority view in the literature is that skill-biased technological change has driven the college premium up and increased inequality over the last several decades.

A further distinction helps us understand the shift of college graduates into "non-college" jobs that we saw above. As explained by Johnson (1997), skill-biased technological change can be "intensive," making skilled workers more productive at their present jobs, or it can be "extensive," replacing unskilled with skilled workers. (Also see Berman, Bound, and Machin 1998.) For example, the introduction of personal computers can make researchers more productive at their present jobs. On the other hand, the introduction of robotics in automobile manufacturing makes skilled workers more efficient in jobs formerly done by unskilled or semiskilled workers. The displaced workers tend to transfer to less rewarding, lower-level jobs. In extensive skill-biased technological change, then, the relative wages of skilled workers increase, while those of unskilled workers decrease. Wages in general may go up a little, but the higher wages of the skilled workers are largely offset by the lower wages of the less skilled.

The growth of computer and information technology may have been a key element in the increased demand for skills. At this point, the research results are suggestive but not conclusive. Johnson (1997) noted that computers had caused an increase in the proportion of jobs normally performed by skilled workers. Autor, Katz, and Krueger (1998) reported that computer investment and employee computer usage were powerful factors in explaining differences in skill upgrading among industries. Katz and Autor (1998) also noted several case studies showing that lagged computer investments and R&D expenditures predicted subsequent increases in the rate of upskilling. Krueger (1993) found that workers who use computers on the job tend to earn more than similar workers who do not use them.[56]

There is some evidence that the increased supply of college graduates in the 1970s contributed to technological change, which in turn increased the demand for skills in the 1980s (Acemoglu 1998). Although the large supply of graduates initially caused the college premium to drop, supply-stimulated technological change then became a factor in the premium rise of the 1980s, in this view.

The second major explanation for growing wage inequality—the emergence of the global economy—emphasizes a decrease in demand for less skilled American workers. According to this explanation, relatively open international markets have resulted in the shift of many unskilled and semiskilled jobs to developing countries that offer corporations lower wages and other advantages, such as less government regulation and lower taxes. This change is causing a major loss of manufacturing jobs, many of them unionized, that were a source of relatively high income, good benefits, and apparent job security for millions of high school graduate workers. The process is sometimes referred to as "deindustrialization." With the manufacturing jobs has gone a substantial portion of the demand for less-skilled labor in the United States.

Manufacturing jobs can be shifted overseas because they produce tradable goods that can be shipped to consumers anywhere. Other jobs—especially in the service sector—are local in nature and not tradable in the international market (Johnson 1997). They include many high-skilled jobs, such as those of doctors and lawyers, and many more less-skilled jobs, such as those of sales clerks, manicurists, waiters, landscape workers, and delivery men and women. The loss of manufacturing jobs has

crowded high school graduate workers into the low-skilled end of the nontradeable sector, reducing their wages, according to the deindustrialization argument.

The weight of evidence indicates that increased openness to global markets is at most a secondary factor in the growth of wage inequality in the 1980s. There are two main reasons for this conclusion. First, the growth in relative demand for skills (and in inequality) occurred primarily *within* industries and sectors, not *between* them (Katz and Autor 1998, Johnson 1997, Topel 1997). The change was not mainly a function of workers shifting from one sector (such as manufacturing) to another (such as service) or from the automotive to the health care industry. As Katz and Autor (1998) noted, Murphy and Welch's analysis of 49 industries (1993) found that the college premium increased 16.2 percent overall and 12.0 percent *within* industries in the 1980s. Among younger workers with 1–10 years' experience, the premium increase was 26 percent for all workers and 20 percent within industries. Based on such data, Katz and Autor estimated that only one-fourth, or less, of the rise in the college wage premium in the 1980s could be explained by between-industry shifts in the composition of employment by education group.[57]

The second reason openness to the global economy is not the major cause of rising wage inequality in the 1980s is that not enough manufacturing and other related jobs have been lost in the process to explain the greatly reduced demand for less skilled workers (Katz and Autor 1998, Johnson 1997, Topel 1997). In Johnson's words, "the share of total unskilled employment that would be employed in the [American] tradable goods sector without the adverse international developments is simply too small to have produced relative demand shifts of the magnitude observed during the 1980s." Katz and Autor (1998) found that the growth of trade with less developed countries accounted for only 1 log point out of a 19 log-point increase in the college wage premium between 1980 and 1995.

In addition to technology and globalism, changes in institutional interventions in the market, such as union activities and the federal minimum wage, are often cited as an important reason for the increasing wage inequality of the 1980s. Indeed, countries such as France and Germany, in which the state and labor unions play a major role in wage determination, have considerably less wage inequality than the United States. In the United States, unionization and real minimum wages declined in the 1980s. Katz and Autor's (1998) review found that by one estimate (Card 1997), male union membership fell from 30.8 percent in 1974–75 to 18.7 percent in 1993; by another estimate (Lee 1998), the real minimum wage fell almost by half (40 log points) between 1981 and 1990.

Katz and Autor (1998) described 4 studies reporting the effects of the decline of unionization on wage inequality. Three of the 4—Bound and Johnson (1992), DiNardo, Fortin, and Lemieux (1996), and Card (1997)—estimated deunionization effects of 8 percent, 10.7 percent, and 12 percent respectively. The fourth study (Freeman1993) estimated a 20 percent effect. In addition, two studies—DiNardo, Fortin, and Lemieux (1996) and Lee (1998)—concluded that the drop in the real minimum wage accounted for most of the inequality increase in the *lower half* of the wage distribution—i.e., between the 50th percentile and the 10th percentile—but had more modest effects on the college wage premium.[58]

In sum, while globalization and reduced institutional interventions in the labor market played some role in the growth of wage inequality, including the college premium, the primary role was played by skill-biased technological change. Tinbergen (1975) described a "race between technological development and access to education" in developed countries. Most of the time since the end of World War II,

technology has been leading and pulling ahead. Except in the 1970s, the growth in demand for skills has outstripped the growth in supply. Looking to the future, Johnson (1997) noted that the likely increase in the supply of college graduates was "not nearly enough to yield the 3 to 5 percent rates of growth of relative supply...necessary to keep up with the likely technologically induced shifts in future demand for high-skilled labor." Hence, we agree with Topel's blunt conclusion about the "overeducation" debate: "Given the unprecedented increase in the returns to education...the public policy debate about whether greater investments in education are socially and privately worthwhile should be over."

Conclusion

Several of the points made by critics of the college movement find qualified support in empirical research. First, there is a widespread belief that high school graduates should go to a 4-year college. However, the belief is not universal, as the critics contend, and the general expectation of "college for all" includes 2-year colleges as well as 4-year schools. Second, the ability of college students, as measured by standardized tests, did decline in the 1970s, but it returned to its previous levels in the 1980s. Third, there has been a moderate decline in 4-year college completion rates over specific time periods, but it is explained at least in part by the fact that students are taking longer to graduate. Nevertheless, the critics are right in observing that many students leave 4-year colleges without graduating. We estimate that about half of the entrants each year—over 600,000 students—eventually leave without graduating.

Critics of the college movement are also right about another major point: The labor market and other outcomes of 4-year college students who leave without graduating are unimpressive. Their wages and earnings are about the same as those of similar 2-year college students with the same amount of education. Their cognitive gains from college are no greater than those of their 2-year-college counterparts. They also are more likely to have debt from student loans than are 2-year-college attenders. However, according to one study, vocational noncompleters from 4-year colleges are an exception to the rule, receiving substantial earnings benefits.

Unlike the noncompleters, 4-year college graduates are doing well in the labor market. Their real earnings have held fairly steady since 1975, though they are a little below their 1973 peak. Except for the atypical 1970s, their wage advantage over high school graduates has been growing for 4 or 5 decades, and possibly longer. The main force behind this growing advantage is skill-biased technological change, which raises the skill requirements of jobs and often replaces less skilled workers with more skilled individuals. In addition to a growing wage premium, the rate of return on investment in college is high.

The apparent shift of some college graduates into "non-college" jobs since the 1970s can be explained in part by the increasing demand for skills in these jobs. As upskilling occurs through the proliferation of technology, many "non-college" jobs become "college-level" jobs. Whether upskilling can account for all of the occupational shift, though, is still unclear.

The findings of this synthesis have implications for prospective or actual college students. It seems obvious that high school graduates enrolling in 4-year colleges should do everything in their power to complete their bachelor's degrees. The earnings of college dropouts are limited. Not only is the 4 years of education important, but the degree itself may increase earnings, especially for males.

Given the limited gains of college noncompleters in the labor market, one is tempted to argue that high school graduates with relatively low grades and test scores, whose chances of attaining a bachelor's degree are also relatively low, would be better off enrolling in community colleges. However, the consistent finding that community college entrants who aspire to bachelor's degrees are less likely to attain them than 4-year-college entrants of similar ability counsels caution. By opting to enter a com-

munity college rather than a 4-year college, a low-achieving high school graduate might be reducing his or her chances of ever getting a bachelor's degree.

The proportion of low-achieving 4-year college entrants who graduate is not trivial. According to Astin's (1996) data, about a fifth of 4-year entrants with high school grade averages of C or less and SAT total scores of 700 or less eventually got BAs. About one fourth of those who earned C+ high school averages and had scores of 700–849 graduated. On the other hand, viewed from the perspective of a high school graduate with these grades and test scores, the chances of eventually attaining a BA degree are not very good—1 out of 4 or 1 out of 5. Losing the advantage of starting at a 4-year school, which Whitaker and Pascarella (1994) estimated at 15 percent, would only reduce their chances to around 1 out of 5 or 1 out of 6.

High school graduates of modest ability or uncertain motivation who are thinking of enrolling in a 4-year college, especially in a liberal arts major, would be well advised to consider enrolling in a community college or an occupational training program such as those offered by the military. A lower-achieving graduate who chose one of these options would slightly reduce his or her (already low) chances of attaining a bachelor's degree but would probably realize the same cognitive development gains and the same or greater earnings at less cost and with less debt.

Further, high school guidance counselors should give more realistic advice to high school seniors with below-average records or those unlikely to persist in college. Rather than advocating "college for all," as many apparently do, they should clearly distinguish among the different postsecondary options and recommend educational paths and goals consistent with student abilities and motivation. For seniors who unrealistically aspire to a bachelor's degree, they should point out that two-year degrees can yield significant earnings benefits. If the students persevere and complete their subbaccalaureate programs, additional postsecondary education may be a viable next step.

The findings in this synthesis also have implications for education policy. In discussing these implications, however, we need to go beyond the present research. The following should be regarded as a reflection on alternative approaches to addressing problems raised by the synthesis.

Clearly, it is important to raise the skill levels of the nation's workforce more rapidly. One way to do so would be to produce more college graduates. It is possible that labor market incentives such as college premiums will yield enough graduates to bring supply and demand into balance. However, even though college enrollments respond to changing premiums, demand has generally outstripped supply for decades. Some higher education advocates believe that the best way to produce more college graduates would be to increase public subsidies to colleges. Many states have reduced their share of support for the cost of college, and the institutions would of course like to see the share increased. This approach has the advantage of being both straightforward and effective. But it has the disadvantage of not being very efficient. As we have pointed out, about half of the new entrants to college leave without completing. Further, the fact that noncompleters earn no more than similar 2-year college noncompleters who cost less to educate raises serious questions about the cost-effectiveness of this approach.

Increasing the supply of college graduates is not the only way to raise the skill levels of the workforce. Many critics of the college movement advocate putting more resources into the expansion and improvement of subbaccalaureate education, especially technical education. While we believe that enrollment

in 2-year colleges should be seriously considered by lower-achieving high school graduates thinking of attending 4-year colleges, it does not follow that public subsidies to community and technical colleges should be increased. Such increases might also support the enrollment of many other students with lower achievement levels for short periods of time. Short periods of education (less than a year) in these colleges yield little in the way of earnings benefits. Further, though it costs less to educate students in 2-year colleges than in 4-year schools, the attrition rate is much higher. Further research on the costs and benefits of public investment in subbaccalaureate education as compared to 4-year education is warranted. Such research should take into account not only the labor-market performance of graduates, but also the performance of noncompleters and the noncompletion rates.

Other researchers, such as Murnane and Levy (1996), believe that elementary/secondary education should be the primary focus of efforts to improve skill levels. The authors observe that "the apparent importance of college depends as much on what K–12 schools are not doing as on what is learned in college." While the skills required by the economy have changed radically in the last 20 years, the skills taught in elementary and secondary schools have changed very little. The authors recommend focusing on work-relevant "new basic skills" i.e., teaching the "hard skills" of reading, math, and problem-solving; the "soft skills" of oral and written communication and the ability to work in groups; and personal computer skills, at much higher levels than many high school graduates currently attain.

The emphasis on improving skills through elementary/secondary education has obvious advantages. Because this approach would work through publicly funded universal education, it would be available to all students, including lower-achieving and disadvantaged students. It would reduce wage inequality by better preparing high school graduates for the workplace, making them more productive and raising their pay. It would also better prepare many high school graduates for postsecondary education. This would reduce noncompletion rates in 2-year and 4-year colleges (holding enrollment rates constant), thus making postsecondary education more efficient. This approach would also produce more graduates from both types of college, helping supply catch up with demand. Though college graduate earnings would be reduced for a given level of demand, the additional degree holders would earn more than they otherwise would have, and earnings inequality would be further reduced.

The advantages of greatly improving skills through elementary/secondary education have been recognized at least since the report of the Excellence Commission in 1983. The standards-based school reform movement emanating from the report has made some gains, but progress has been slow and difficult. Currently, attention is shifting to improving teacher quality. The improvement of elementary and secondary schooling remains and should remain a primary goal of education policy. The key question is, what are the most effective and cost-effective ways of achieving this goal?

Expanding continuing occupational education and training is yet another way to improve workforce skills. This approach is proving valuable for updating skills and preparing adult workers for job and career changes. However, success in such education and training efforts depends on underlying cognitive skills and personal qualities such as persistence. The many workers who have such skills and qualities can benefit substantially from this approach. However, it is proving very difficult to engender these skills and attributes in adults who do not have them. In this case, improved elementary/secondary education again seems to be the key.

Since at least the turn of the century, the nation's chief response to the economy's increasing demand for skills has been to increase the average years of education in the labor force. This process is still going on, but we wonder how long it can continue. Will most workers a century from now have a Ph.D.-level education? Over time, additional years of education will become more and more expensive, as additional years of work experience are foregone. One alternative is to pack more learning and skill development into earlier years of education. There have already been some steps in this direction. For example, the College Board's popular Advanced Placement (AP) tests and the related AP courses enable students to gain college credits while still in high school. Some students who acquire many AP credits can graduate from college in 3 years rather than 4, saving both private and public postsecondary costs. Substantially raising the skill level of high school graduates in general would have a similar effect, enabling many to get and hold jobs that now require some college. Whether increasing learning in the elementary/ secondary years—and in early childhood—will replace increasing years of education as society's principal response to the demands of technological change—or whether other strategies will emerge—remains to be seen.

Endnotes

1 Page 261.

2 Almost two-thirds of 1980 high school sophomores in the High School and Beyond Survey (64.5 percent) had enrolled in a postsecondary institution by 1992. However, a considerably smaller proportion (42.7 percent) had attained any postsecondary degree by that time.

3 Page 653.

4 Page 653.

5 Page B2.

6 Page 188.

7 Page 1.

8 Page 653.

9 Page B1.

10 The internal quote is from Frank Levy, who was interviewed by Harwood. Levy is coauthor, with Richard J.Murnane, of *Teaching the New Basic Skills* (Murnane and Levy 1996).

11 Page B1.

12 Page 654. Robert Samuelson (1998) also sees a "glut of bad students" in college, but posits a different cause. Postsecondary education, he believes, is oversubsidized, causing "too many colleges to chase too few good students. To survive, colleges scramble to get bad students..."

13 Pages 653-654.

14 Page B1.

15 Page 656.

16 Page B2.

17 Page 6.

18 Page B2.

19 Page 654.

[20] Page 654.

[21] Page B2.

[22] Since data are not available for October 1972 and October 1980, we used data from October 1973 and October 1981. For the sake of consistency, we also used data from October 1993 rather than October 1992. The 1993 data are very similar to 1992 data, differing only 0.6 percent for 2-year colleges and 0.2 percent for 4-year colleges.

[23] There were some declines between 1972 and 1980 in the percentage of high school seniors who said they expected to complete postsecondary education. This change no doubt corresponded to the decline in college premiums in the 1970s, which we discuss later.

[24] The data are only suggestive, because, as the previous footnote indicates, enrollments in part "c" occurred a year later than those planned (in part "b"). The individuals involved in parts "b" and "c" of the table are not the same.

[25] These were members of the 1980 sophomore cohort, interviewed 2 years later.

[26] It is sometimes argued that because college graduates make up a larger proportion of their age cohorts than before, they must include more graduates of lower ability than before. That may be true if we assume that the ability referred to is native ability, that its level and distribution have not changed over time, and that colleges start selecting at the high end of the distribution and work downward. However, the key to performance in college and elsewhere is *functional ability*, rather than native ability as such. Standardized achievement tests measure functional cognitive ability and predict performance in college, especially for freshmen. The math, verbal, and other skills they assess are the result of a combination of native ability, family, schooling, and a variety of other factors. Even if the mean native ability of college-age age cohorts has remained constant over the years, family circumstances and schooling have changed in ways that affect the mean achievement levels of youth. As we saw earlier, young people today have much more schooling than they did at the turn of the century, and levels of parental education, almost certainly a factor in student achievement scores, have increased correspondingly. These are only two of the many factors that can cause average achievement scores to change over time. There can be little question that if a standardized achievement test such as the National Assessment of Educational Progress (NAEP) had been administered to all 17-year-olds at the turn of the century, the mean scores would have been much lower than they would be if it were administered to a similar cohort today. So it's not necessarily true that enrolling a larger proportion of a youth cohort in college will cause the mean functional ability levels of college students to decrease over time, whatever their native ability levels may be.

[27] James Maxey at the ACT Program provided the reports from which the data for this analysis were drawn.

[28] John Bishop (1989) discusses the broad decline in test scores from 1967 to 1980.

[29] The pattern over time is different for college freshmen and high school seniors. The ACT scores of seniors declined between 1970 and 1980 and then began a recovery. However, their recovery did not reach the levels of 1970 (*1997 Digest of Education Statistics,* table 134). The same is true of the SAT tests (*Digest,* table 129).

[30] It is unclear whether Bishop's freshmen include those in 2-year colleges. They seem to.

[31] Astin et al. (1996) point out that elements of ACT's methodology tend to inflate the estimates. For example, ACT weighted private colleges, which tend to have higher graduation rates, the same as the larger public colleges, which have lower rates.

[32] An increase in the proportion of such students would cause the bachelor's degree completion rate to fall, but would not necessarily cause the dropout rate to rise. These students would not be counted as dropouts because they were still in school or because they had attained certification other than a bachelor's degree.

[33] See indicator 11 and table 11-1 of *The Condition of Education 1996* (Smith et al. 1996).

[34] This finding does not contradict the NCES finding that the proportion of young people taking longer than 6 years after high school to get a BA increased from 25 percent to 32 percent between 1977 and 1990. The starting point for the NCES figures is high school graduation; the starting point for Astin's figures is entry into college.

[35] Table 181.

[36] One feature of community colleges that is associated with lower completion rates is that they are not residential institutions. Campus life in residential institutions strengthens a student's attachment and commitment to the institution and thus tends to increase persistence.

[37] In this particular analysis, Hecker is not specific about the period of increase. It seems to be approximately 1970–1990. However, the pattern of change over this period is complex and does not easily translate into an argument that both premiums and proportions of college graduates in non-college jobs increased. The greatest increase in the non-college job proportion occurred in the 1970s, at a time when the college premium was declining. In the 1980s, when the premium was again ascendant, the proportion of college graduates in non-college jobs was leveling off.

[38] The "bumping" of high school graduates out of the higher-paying non-college jobs is consistent with Lester Thurow's (1975) "job competition" model of employment and wages. Thurow argues that employers use education level as a proxy for ability and select the most able job-seekers available, whatever the skill level of the job.

[39] The authors call them "high school" jobs, though they use Hecker's classification.

[40] In occupations where the average education level was more than high school but less than 4 years of college, Pryor and Schaffer found a similar but less pronounced pattern.

[41] Other explanations are possible, but we think they are not supported by the weight of empirical evidence. For example, if Spence (1973) is right, colleges just screen out less able students and graduate the more able ones. Then, following Thurow's (1975) theory, firms would prefer to hire the more able applicants, regardless of the skill level required by the job. The college premium could increase if the real earnings of high school graduates fell for reasons unrelated to their own skills and the skills needed for the job. Such reasons might include reduced union bargaining power and a diminished real minimum wage. The section entitled *The Value of a College Degree in Perspective* examines the evidence for de-unionization and reduced minimum wages as factors in the growing difference between college and high school earnings.

[42] Data are from the Bureau of Labor Statistics Internet web site. Estimated weekly earnings for male college graduates were $800 in 1994, $794 in 1995, and $796 in 1996. Weekly earnings for females were $621 in 1994, $616 in 1995, and $608 in 1996.

[43] The purpose of this analysis is to compare premiums in the 1970s with premiums before and after the 1970s. If the study in question did not include the 1970s, the year of the low rate was not shown in table A-3.

[44] In technical terms, the internal rate of return is measured by the discount rate that equates the present value of the difference between the lifetime earnings of college graduates and the lifetime earnings of similar high school graduates with the present value of the costs of college.

46

[45] Freeman and McCarthy (1982) also show that humanities and social science majors suffered the greatest decline in earnings premiums in the early 1970s. One explanation for the higher earnings of occupational majors is that occupational education may give graduates an earnings advantage in entry-level jobs because employers, who do not have to train them extensively, are willing to pay more for their services. Over longer periods, graduates of other majors may gain the training and work experience they need to command comparable earnings. However, Fox (1988) emphasizes supply factors. He shows that increases in the size of graduating classes from a major, relative to population, tend to depress starting salaries. Since there are more arts and science majors than business and engineering majors, their starting salaries are lower. If Fox is right, why don't more students shift from the less rewarding arts and sciences to the more rewarding science and engineering majors? One possible explanation is that liberal arts majors may be less motivated by monetary incentives than business and engineering majors, on average. Another is that many students may regard business and engineering majors as more difficult and intrinsically less rewarding (e.g., less interesting) than arts and science majors.

[46] One of the striking findings in the inequality literature is that the growth of wage inequality has been greater within groups of the same gender, education, race, and experience than between such groups (Katz and Autor 1998, Gottschalk 1997).

[47] Katz and Autor (1998) actually use a supply/demand/institution framework. In addition to supply and demand, institutional interventions in the market such as union bargaining and minimum wage setting are factors in variation in wages.

[48] Indeed, as Goldin and Katz (1998) pointed out, the demand for skilled labor has been growing for most of the century, a fact passed over in much of the literature.

[49] Snyder et al. (1998), table 244.

[50] U.S. Bureau of the Census (1974, 1982, 1992, 1993a, 1993b, 1993c, 1996).

[51] See figures 3 and 4 in Topel's article.

[52] Page 42.

[53] Page 72.

[54] Another view is that the oversupply of college graduates in the 1970s actually contributed to the increased premiums of the 1980s. See discussion below and Acemoglu (1998).

[55] Page 61.

[56] We need to keep in mind that "technology" includes more than computers and information management. The 1980s were also a decade of major change in the organization of work in business and industry. Organizational innovations such as the "high-performance workplace" based on principles pioneered by W. Edwards Deming in Japan tended to require higher-level skills and to improve productivity. How large a role such changes played in the growth of inequality is unknown, but they should not be overlooked.

[57] Not all of these between-industry shifts are due to globalism; but on the other hand, some within-industry shifts are due to more open global markets. Outsourcing—a firm's contracting to have some of its work done by others—has grown in recent years. A good deal of outsourcing goes to contractors in other countries. To the extent that U.S. firms contract abroad for low-skilled labor, they change the domestic skill mix within the firm, driving up the relative demand for skills. How large an effect outsourcing abroad has had on the growth of demand for skills is a subject of debate. Berman et al. (1994) conclude that the effect is small, while Feenstra and Hanson (1996) conclude that it is an important factor in the growth of demand in the 1980s.

[58] Page 51.

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Appendix A: Tables

Table A-1

Controlled earnings, by sex and type of institution

Completers
(Premiums for degrees)

						Men						Women					
Author(s)	*Source*	*Data*	*Last svy yr*	*Statistic*	*Instit. Subtype*	*Voc. School*	*Sig*	*2-year college*	*Sig*	*4-year college*	*Sig*	*Voc. School*	*Sig*	*2-year college*	*Sig*	*4-year college*	*Sig*
Surrette (1997)	Table 2.3	NLSY	1989	Log wage premia				0.122		0.228							
	Table 2.4	NLSY	1989	Log wage premia				0.065		0.191							
	Table 4.1	NLSY	1990	Log wage premia		0.050		0.083		0.240							
Kane & Rouse (1995b)	Table 2	NLS72	1986	Log wage premia				0.0412		0.2291				0.2337		0.2841	
				Log earnings premia				0.0734		0.2808				0.2561		0.3898	
Kane & Rouse (1995b)	Table 3	NLSY	1990	Log wage premia				0.2068		0.3386				0.1877		0.3311	
				Log earnings premia				0.2357		0.4223				0.3085		0.513	
Kane & Rouse (1995a)	Tables 2.3	NLS72	1986	$ earnings premia	ac	-891		2139		6411		1315		2097		3830	
					voc			1230						2171			
Grubb (1995b)	Table 2	NLS72	1986	$ wage premia	ac	-0.143	ns	-0.691	ns	2.08	*	0.232	ns	0.136	ns	2.04	*
					voc			-0.260	ns					1.51	*		
				$ earnings premia	ac	-1801	ns	-1927	ns	5566	*	608	ns	572	ns	4641	*
					voc			975	ns					2723	*		
Grubb (1995b)	Table 6	SIPP84	1984	log earnings premia		0.219	*	0.184	*	0.415	*	0.164	*	0.311	*	0.355	*
Grubb (1995b)	Table 6	SIPP87	1987	log earnings premia		0.146	*	0.215	*	0.394	*	0.164	*	0.234	*	0.318	*

Statistical significance:
* Significantly different from high school graduates p. < .05
ns Not significantly different from high school graduates p.>=.05
(blank) No indication of statistical significance.

Abbreviations:
ac = academic
voc = vocational

Source: Studies in this table.

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Table A-1 (cont'd) **Controlled earnings, by sex and type of institution (cont'd)**

Noncompleters
(Premiums for 1 year of credits)

						Men						Women					
Author(s)	*Source*	*Data*	*Last svy yr*	*Statistic*	*Institut. Subtype*	*Voc. School*	*Sig*	*2-year college*	*Sig*	*4-year college*	*Sig*	*Voc. School*	*Sig*	*2-year college*	*Sig*	*4-year college*	*Sig*
Surrette (1997)	Table 4.1	NLSY	1990	Log wage premia per credit year				0.118		0.089							
Kane & Rouse (1995b)	Table 2 Column ii	NLS72	1986	Log wage premia per credit year				0.0424	ns	0.0458				0.0643	ns	0.0620	
	Table 2 Column iii			Same				0.0412	ns	0.0022				0.0583	ns	0.0679	
	Table 2 Column v			Log earnings premia per credit year				0.0353	ns	0.0561				0.0658	ns	0.0859	
	Table 2 Column vi			Same				0.0571	*	0.0262				0.0655	ns	0.1007	
Kane & Rouse (1995a)	Tables 2.3	NLS72	1986	$ earnings premia per credit year		-1301		1337		588		167		1044		363	
Grubb (1995b)	Table 2	NLS72	1986	$ wage premia per academic credit	cc			-0.010	ns	-0.0072	ns			0.048	*	-0.004	ns
					ti			-0.001	ns					0.100	*		
					prop			0.888	*					-0.094			
				$ earnings premia per academic credit	cc			4.5	ns	-32.7	*			46	*	7.6	ns
					ti			32.2	ns					47.4	ns		
					prop			-439	ns					-25.2	ns		
Grubb (1995b)	Table 2	NLS72	1986	$ wage premia/ vocational credit	cc			0.040		0.023	*			-0.023	ns	0.046	*
					ti			-0.025	ns					-0.045	*		
					prop			-0.080	*					0.049	*		
				$ earnings premia per vocational credit	cc			88.8	*	129.2	*			-7.7	ns	43.6	*
					ti			-56.1	ns					-34.7	ns		
					prop			-68.9	ns					68.1	ns		
Breneman & Nelson (1981)	Table 2-5	NLS72	1976	$ wage premia					ns								

Statistical significance:
* Significantly different from high school graduates p. < .05
ns Not significantly different from high school graduates p.>=.05
(blank) No indication of statistical significance. prop = proprietary school
* 2-year significantly different from 4-year p.<.05
ns 2-year not significantly different from 4-year p.>=.05

Abbreviations:
cc = community college
ti = technical institute
prop = proprietary school

Source: Studies in this table.

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Table A-1 (cont'd) **Controlled earnings, by sex and type of Institution (cont'd)**

Completers and noncompleters

						Both sexes			
Author(s)	*Source*	*Data*	*Last svy yr*	*Statistic*	*Institute Subtype*	*2-year college*	*Sig*	*4-year college*	*Sig*
Whitaker & Pascarella (1994)	Table 5	NLS72	1986	log annual earnings 2yr vs 4yr		0.041	ns *	c	
Monk-Turner (1988)	Table 3	NLS72	HSG +10yrs	log wages		0.054	ns	0.079	*
Anderson (1984)	Table 9	NLS72	1977-8	earnings	Private 2-year	-0.012	ns		
					Public college	c	ns	-0.054	
					Private college	c	ns	-0.058	
					Public university	c	ns	0.204	
					Private university	c	ns	0.134	

Statistical significance:

c	Comparison group
*	Significantly different from high school graduates p. < .05
ns	Not significantly different from high school graduates p. >=.05
(blank)	No indication of statistical significance.
*	2-year significantly different from 4-year p. <.05
ns	2-year not significantly different from 4-year p .>=.05

Source: Studies in this table.

Table A-2 **Studies comparing earnings associated with degrees and earnings associated with years of postsecondary attendance**

Comparison of earnings from degrees with earnings from similar years of credits

Author	Data	Degree	Men	Women
Anonymous (1998)	NLSY, 1989, wages	Bachelor's	> 4 years	> 4 years
Surette (1997)	NLSY, 1989, wages	Bachelor's	> 4 years	
Kane and Rouse (1995b)	NLS72, 1990, wages	BA	> 4 years	= 4 years n.s.
Kane and Rouse (1995b)	NLS72, 1990 earnings	BA	> 4 years	= 4 years n.s.
Grubb (1995e)	SIPP, 1984, earnings	BA/BS	> 4 years	<= 4 years
Grubb (1995e)	SIPP, 1987 earnings	BA/BS	> 4 years	> 4 years
Grubb (1995e)	SIPP 1990, earnings	BA/BS	> 4 years	<= 4 years
Grubb (1995b)	NLS72,1986, wages	BA/BS, academic	> 4 years	> 4 years
Grubb (1995b)	NLS72, 1986, earnings	BA/BS academic	> 4 years	> 4 years
Grubb (1995b)	NLS72, 1986, wages	BA/BS, vocational	<= 4 years	< 4 years
Grubb (1995b)	NLS72, 1986, earnings	BA/BS, vocational	< 4 years	<= 4 years
Anonymous (1998)	NLSY, 1989,wages	Associate's	> 2 years	> 2 years
Surette 1997	NLSY, 1989,wages	Associate's	> 2 years	
Kane and Rouse (1995a)	NLS72, 1986, earnings	AA	< 2 years n.s.	= 2 years n.s.
Kane and Rouse (1995b)	NLS72, 1986,wages	AA	< 2 years n.s.	> 2 years sig.
Kane and Rouse (1995b)	NLS72, 1986, earnings	AA	< 2 years n.s.	= 2 years n.s.
Kane and Rouse (1995b)	NLSY,1990,wages	AA	> 2-yr or 4-yr dropout	> 2-yr or 4-yr dropout
Kane and Rouse (1995b)	NLSY, 1990, earnings	AA	> 2-yr or 4-yr dropout	> 2-yr or 4-yr dropout
Grubb (1995e)	SIPP 1984, earnings	Associate	> 2 years	> 2 years
Grubb (1995e)	SIPP 1987, earnings	Associate	> 2 years	> 2 years
Grubb (1995e)	SIPP 1990, earnings	Associate	> 2 years	> 2 years
Grubb (1995b)	NLS72,1986, wages	Associate, academic	< 2 years	< 2 years
Grubb (1995b)	NLS72, 1986, earnings	Associate, academic	< 2 years	< 2 years
Grubb (1995b)	NLS72, 1986, wages	Associate, vocational	< 2 years	> 2 years
Grubb (1995b)	NLS72, 1986, earnings	Associate, vocational	< 2 years	> 2 years

Source: Studies in this table.

Table A-3 Studies with college premiums over time

Author	See:	Population	Monetary measure	First/last years	Low year	Controls	Data Source
Bishop (1997)	Fig. 7	Age 25+, FTYR	Annual earnings	1989 1993	**	Sex	
Blackburn et al.(1991)	Table I	Age 25+, FTYR	Annual earnings	1979 1988	1977, 1980	Age, sex, race	March CPS
Borjas & Ramey (1994)	Fig. 1		Log weekly wages	1963 1988	1979		CPS
Bound & Johnson (1992)	Table 1	All workers, some exclusions	Hourly wages	1973 1988	1979	Sex, experience	CPS
Freeman & McCarthy (1982)	Table I	Age 25+, FTYR	Annual earnings	1969 1982	1974	Age, sex	Census, CPS Consumer Income
Gottschalk (1997)	Fig. 5	All workers	Log weekly earnings	1963 1993	1976, 1979	Sex, experience, race, region, PCE*	March CPS
Hecker (1992)	Chart I	Age 25+, FTYR	Annual earnings	1967 1990	1978, 1980	Sex	CPS
Katz and Autor (1998)	Fig. 5b		Log weekly wages	1963 1995	1977	Sex, experience, PCE*	CPS
Katz & Murphy (1991)	Fig. I C	Full-time, at least 1 week	Log weekly wages	1963 1987	1979, 1981	Sex, experience	March CPS
Lydon (1989)	Tabs. 4, 6		Weekly earnings	1940 1988	1980	Age, experience, sex, race	Census (1940-1980) CPS (1988)
McMahon & Wagner (1982)	Table 1	Ages 25-34	Earnings	1967 1979	1974		CPS, Series P-60.
		Ages 35-44	Earnings	1967 1979	1968, 1978		
Mishel & Bernstein (1992)	Figs. 1, 2		Hourly wages	1987 1991		Sex	BLS/Employment Cost Index Series, CPS
Murphy & Welch (1989)	Fig. 1	Age 16-64	Weekly wages	1963 1986	1973, 1979	Sex, experience, race	March CPS
Murphy & Welch (1992)	Figure II	White males, FT, g.e. 40 wks/yr. Exclusions	Hourly wages	1963 1989	1979, 1981		
Rumberger (1984)	Table 3	White males 25-29	Log hourly annual earnings	1971 1976	1976	Experience, SMSA, South, marital status, health	NLS Labor Market Experience
Smith & Welch (1978)	Table 1	Males 25-44	Annual earnings	1967 1976	1974	Age, FT/PT	CPS
Smith (1986)	Figure 2	Males 25-34 and 25+ FTYR	Annual income	1967 1983	1974	Age	CPS
Smith et al. (1996)	Table 34-2	Age 25-34	Annual earnings (median)	1970 1994	1974, 1980	Sex, race/ethnic.	March CPS
Topel (1997)	Fig. 2		Wages	1963 1994	1978		CPS

* PCE = personal consumption expenditures deflator.

** Data do not cover the 1970s.

Source: Studies in this table.

Table A-4 **Private IROR by author, and means**

Authors/studies	Year	Rate	Average
Multiple observations			
Becker(1975)	1939	12.5	12.0
Becker(1975)	1949	11.5	
Becker(1975)	1956	10.9	
Becker(1975)	1958	13.0	
Borland & Yett (1967)	1949	12.7	13.8
Borland & Yett (1967)	1959	14.8	
Carnoy & Marenbach (1975)	1939	21.4	17.0
Carnoy & Marenbach (1975)	1949	13.2	
Carnoy & Marenbach (1975)	1959	17.6	
Carnoy & Marenbach (1975)	1969	15.8	
Freeman (1975)	1959	11.0	10.4
Freeman (1975)	1969	11.5	
Freeman (1975)	1972	10.5	
Freeman (1975)	1974	8.5	
Freeman (1977)*	1968	11.8	10.3
Freeman (1977)*	1973	8.8	
Greer (1976)	1959	15.2	16.1
Greer (1976)	1969	17.0	
Mincer (1962)	1939	11.0	11.0
Mincer (1962)	1949	10.6	
Mincer (1962)	1958	11.5	
Psacharopoulos (1980)	1968	8.3	7.0
Psacharopoulos (1980)	1969	8.8	
Psacharopoulos (1980)	1970	8.8	
Psacharopoulos (1980)	1971	8.0	
Psacharopoulos (1980)	1972	7.8	
Psacharopoulos (1980)	1973	5.5	
Psacharopoulos (1980)	1974	4.8	
Psacharopoulos (1980)	1975	5.3	
Psacharopoulos (1980)	1976	5.3	
Witmer (1983)	1962	15.0	15.9
Witmer(1983)	1972	15.6	
Witmer (1983)	1980	16.5	
Witmer (1983)	1982	16.5	
One observation			
Becker & Cheswick (1966)	1959	8.5	8.5
Eckaus (1973)	1959	11.5	11.5
Hanoch(1967)	1959	9.6	9.6
Hansen (1963)	1949	10.1	10.1
Hines et al. (1970)	1959	13.2	12.0
Mincer (1974)	1959	12.8	12.8
Morgan & David (1963)	1960	5.0	5.0
McMahon & Wagner (1982)	1976	17.0	17.0
Grand mean			**11.8**

* Estimate is mid-point of range.

Source: Studies in this table.

Social IROR by author, and means

Table A-5

Authors/studies	Year	Rate	Average
Multiple observations			
Becker(1975)	1939	11.4	11.2
Becker (1975)	1949	11.0	
Carnoy & Marenbach (1975)	1939	10.7	10.9
Carnoy & Marenbach (1975)	1949	10.6	
Carnoy & Marenbach (1975)	1959	11.3	
Carnoy & Marenbach (1975)	1969	10.9	
Cohn & Hughes (1994)	1969	15.1	15.0
Cohn & Hughes (1994)	1974	10.5	
Cohn & Hughes (1994)	1978	14.1	
Cohn & Hughes (1994)	1982	17.7	
Cohn & Hughes (1994)	1985	17.6	
Freeman (1975)	1959	10.5	9.7
Freeman (1975)	1969	11.1	
Freeman (1975)	1972	9.5	
Freeman (1975)	1974	7.5	
Freeman (1977)*	1968	12.5	11.0
Freeman (1977)*	1973	9.5	
Liberman (1979)**	1958	14.2	14.1
Liberman (1979)	1959	14.2	
Liberman (1979)	1961	14.2	
Liberman (1979)	1963	13.4	
Liberman (1979)	1964	13.3	
Liberman (1979)	1966	13.5	
Liberman (1979)	1967	13.8	
Liberman (1979)	1968	14.2	
Liberman (1979)	1969	14.1	
Liberman (1979)	1970	14.4	
Liberman (1979)	1971	15.0	
Liberman (1979)	1972	14.5	
Liberman (1979)	1973	12.1	
Liberman (1979)	1974	13.9	
Liberman (1979)	1975	14.9	
Liberman (1979)	1976	15.2	

Authors/studies	Year	Rate	Average
McMahon (1991)	1967	9.0	10.2
McMahon (1991)	1968	9.0	
McMahon (1991)	1969	9.0	
McMahon (1991)	1970	15.0	
McMahon (1991)	1971	13.0	
McMahon (1991)	1972	9.0	
McMahon (1991)	1973	8.0	
McMahon (1991)	1974	9.0	
McMahon (1991).	1975	10.0	
McMahon (1991)	1976	9.0	
McMahon (1991)	1977	8.0	
McMahon (1991)	1978	8.0	
McMahon (1991)	1979	9.0	
McMahon (1991)	1980	9.0	
McMahon (1991)	1981	10.0	
McMahon (1991)	1982	10.0	
McMahon (1991)	1983	10.0	
McMahon (1991)	1984	12.0	
McMahon (1991)	1985	13.0	
McMahon (1991)	1986	13.0	
McMahon (1991)	1987	12.0	
Witmer (1980)	1961	14.2	14.0
Witmer (1980)	1962	14.1	
Witmer (1980)	1963	14.1	
Witmer (1980)	1964	14.4	
Witmer (1980)	1965	14.5	
Witmer (1980)	1966	13.8	
Witmer (1980)	1967	13.2	
Witmer (1980)	1968	13.1	
Witmer (1980)	1969	13.4	
Witmer (1980)	1970	13.4	
Witmer (1980)	1971	13.6	
Witmer (1980)	1972	14.0	
Witmer (1980)	1973	13.9	
Witmer (1980)	1974	14.7	
Witmer (1980)	1975	15.1	
Witmer (1983)	1961-62	13.8	13.3
Witmer (1983)	1971-72	12.4	
Witmer (1983)	1979-80	13.4	
Witmer (1983)	1981-82	13.5	
One observation			
McMahon & Wagner (1982)	1969	13.0	13.0
Hansen (1963)	1949	10.2	10.2
Hines et al. (1970)	1959	9.7	9.7
Johnson & Stafford (1973)	1965	8.8	8.8
Grand mean			**11.6**

* Midpoint of range.

** Data from unpublished paper reported in McMahon and Wagner (1982).

Source: Studies in this table.

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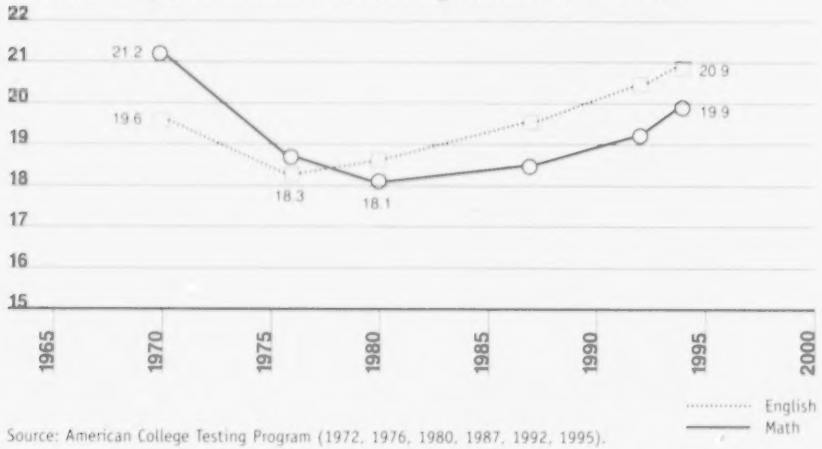
Table A-6 Private and social IRORs for authors reporting both

Authors/studies	Year	Private Rate	Avg.	Social Rate	Avg.
Multiple observations					
Becker (1975)	1939	12.5	12.0	11.4	11.2
Becker (1975)	1949	11.5		11.0	
Carnoy & Marenbach (1975)	1939	21.4	16.8	10.7	10.9
Carnoy & Marenbach (1975)	1949	12.4		10.6	
Carnoy & Marenbach (1975)	1959	17.6		11.3	
Carnoy & Marenbach (1975)	1969	15.8		10.9	
Freeman (1975)	1959	11.0	10.4	10.5	10.1
Freeman (1977)	1968	11.8		12.5	
Freeman (1975)	1969	11.5		11.1	
Freeman (1975)	1972	10.5		9.5	
Freeman (1977)	1973	8.8		9.5	
Freeman (1975)	1974	8.5		7.5	
Witmer (1983)	1962	15.0	15.9	13.8	13.3
Witmer (1983)	1972	15.6		12.4	
Witmer (1983)	1980	16.5		13.4	
Witmer (1983)	1982	16.5	13.5		
One observation					
Hines et al. (1970)	1959	13.2	13.2	9.7	9.7
McMahon & Wagner (1982)	1976	17.0	17.0	13.0	13.0
Grand mean			**14.2**		**11.4**

Source: Studies in this table.

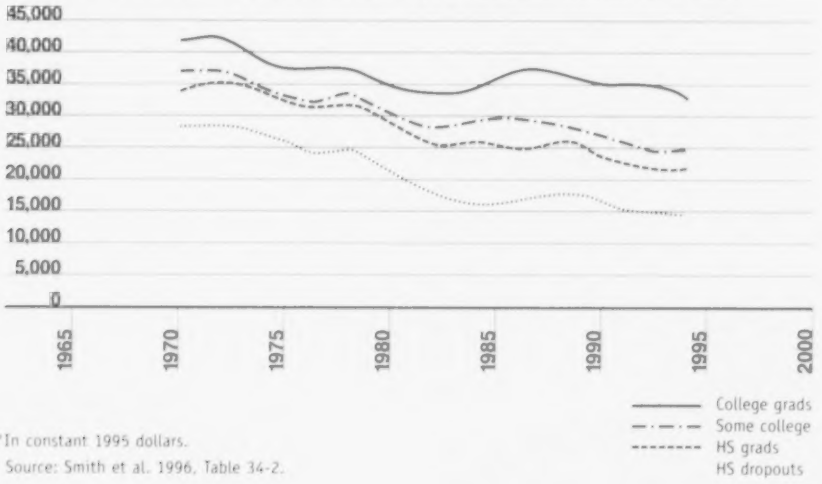
Appendix B: Figures

Figure B-1 **Mean ACT English and math scores, college freshmen, 1971–1994**



Source: American College Testing Program (1972, 1976, 1980, 1987, 1992, 1995).

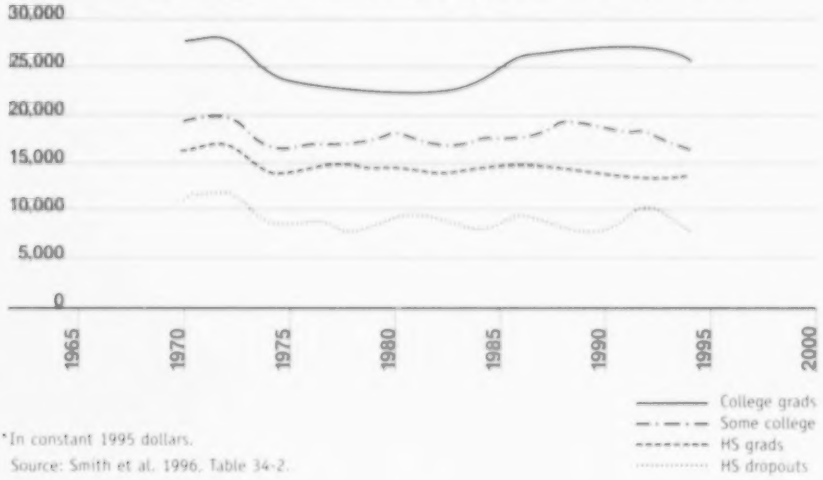
Figure B-2 **Median annual earnings* of males 25–34, by education level, 1970–1994**



*In constant 1995 dollars.

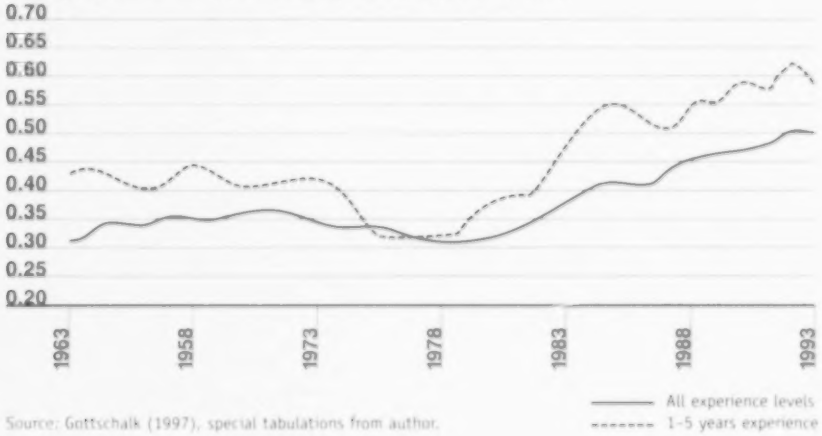
Source: Smith et al. 1996, Table 34-2.

Median annual earnings* of females 25–34, by education level, 1970–1994 Figure B-3



*In constant 1995 dollars.
Source: Smith et al. 1996, Table 34-2.

College premiums 1963–1993, by work experience level Figure B-4



Source: Gottschalk (1997), special tabulations from author.

Appendix C:
Adjusting Post-1989 ACT Scores

The concordance for new and old ACT scores, shown below in table C-1, provides only a rough, full-point correspondence between the 2 sets. Sometimes 2 identical new scores correspond to 1 old score, and vice-versa.

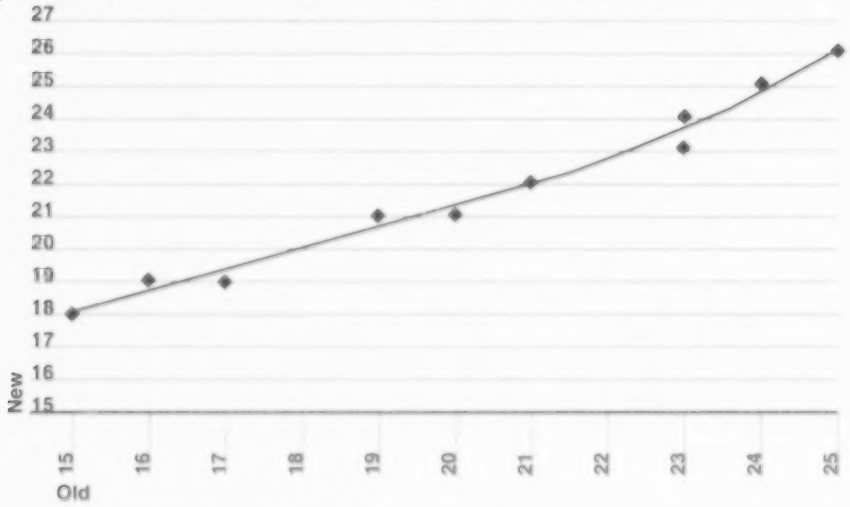
Concordance of old and new ACT scores (pre-1989 and post-1989) **Table C-1**

Old	New
1	3
2	5
3	7
4	9
5	11
6	11
7	12
8	13
9	14
10	14
11	15
12	16
13	17
14	17
15	18
16	19
17	19
18	20
19	21
20	21
21	22
23	23
23	24
24	25
25	26
26	27
27	28
28	29
29	30
30	31
31	32
32	33
33	34
34	35
35	36

Source: American College Testing Program (1989)

To convert old scores from new with greater precision (i.e., to a tenth of a point), we fit several curves to a plot of old and new data. The curve that fit best was a 4th-order polynomial (see figure C-1), and we used it for the conversion.

Figure C-1 **ACT concordance—new scores with old scores, 15–25 range**



Source: American College Testing Program (1989).

Appendix D:
Research on Human Capital and Screening Theories

Accepting the positive relationship between education and subsequent earnings, there is a voluminous literature on why this relationship exists. This appendix reports briefly on that literature. The older explanation, human capital theory, first developed by Becker (1962) and by Schultz (1962), states that skills acquired in school contribute to an individual's subsequent productivity. In turn, profit maximizing firms pay higher wages to more productive individuals. Alternative explanations, screening and signaling theories, appear in the economics literature in the early 1970's as economists began to explore the consequences of imperfect information (Arrow 1973, Spence 1973). The screening argument is that employers have imperfect information about the productivity of potential employees. One readily available piece of information is years of education. If potential employees who have traits and abilities that make them productive also get high levels of education, employers can use education as a "screen," increasing the probability of hiring productive workers by hiring only those with high levels of education. Particularly able workers, for their part, realize that employers have imperfect information about which workers will be productive and which will not. Accordingly, they will acquire high levels of education to "signal" their ability to employers. These high-ability individuals also have ability to succeed in school. Low ability individuals might also wish to acquire high levels of education, so that they could get through the screen, but their lack of ability makes it difficult for them to succeed in school. Thus, the argument goes, it is not that schooling imparts any productivity-enhancing skills, but rather that, in a world of imperfect information, schooling identifies those who are inherently more productive. Note that the screening/signaling argument is different from a credentialism argument that says employers hire people with credentials but that the required credentials have little or nothing to do with actual productivity on the job. The screening/signaling approach, like the human capital approach, says that those with credentials are in fact more productive than those without credentials. The difference between the two is that human capital theory says that schooling adds to productivity, while screening theory says that schooling serves to identify productive people.

Because human capital theory and screening theory both explain the positive relationship between education and earnings as resulting from a positive relationship between education and productive ability, it is very difficult to separate the two explanations empirically, and thus to determine which is more correct. There have been a great many studies attempting to do so, using a wide variety of approaches. These cannot be systematically surveyed here. Instead we shall note a limited number of recent papers. An excellent, although not comprehensive, bibliography appears in Weiss (1995). One approach to separating the 2 explanations relates to employer learning. While employers may initially lack information on the productive abilities of their hires, they will over time acquire information. If education does not enhance productivity but only identifies productive people, then education should become less correlated with earnings as job experience accumulates. Pascarella and Terenzini (1991) cite a number of studies taking this approach. The conclusion from this work is fairly clear—education does not appear to decline in importance as experience increases. This approach does not really separate the two explanations, however, because, if education is an effective screen, the better educated

are the more productive, and they will thus earn more on average even after employers have more information. Altonji and Pierret (1996) seek to overcome that objection by exploring empirically how quickly employers learn about productivity of workers. They do this by examining how coefficients on proxies for ability, presumably unobserved by employers at initial hire, change over time. If employers are found to learn quickly, the return paid to a signal will be small, hence whatever return is paid to education must be due to accumulated human capital. The authors find that the coefficients on ability proxies rise with experience, suggesting that employers do in fact learn about worker productivity. Using these estimates, they calculate a range of estimates of the return to education assuming education had no productivity enhancing effect. They conclude from their calculations that the signaling component of the return to education is small.

Another recent approach is to examine samples of twins who are raised in the same household. The argument is that abilities and family background are similar, so that any unobserved abilities relating to productivity would be the same for each pair. The relationship between education and earnings thus must relate to the productivity- enhancing effect of the education. Ashenfelter and Krueger (1994) and Miller, Mulvey and Martin (1995) studied large samples of twins in the United States and Australia, respectively. Both studies use an instrumental variables approach to minimize omitted variables bias. Both find that the relationship between education and earnings is dominated by the education itself—i.e. education is productivity enhancing. Ability and family background play relatively little role. Weiss (1995), however, argues that twin studies are not definitive. He notes that a screening model would produce the same result as long as employers do not observe the education choices of both twins in a pair. A screening employer uses an observable variable—years of schooling—to proxy for an unobserved variable—capacity to be productive. Not knowing the education level of the twin of the prospective employee, the employer will hire and pay a wage based on the observed variable, schooling, for the individual. The twin with more schooling will get higher wages in the marketplace.

A third recent approach, by Kroch and Sjoblom (1994) seeks to separate the explanations by examining both the absolute amount of education a worker has and also the amount of education that worker has relative to his/her peers. They argue that the relative education level, not the absolute education level, of a potential worker is in fact the signaling variable. Assuming that the underlying distribution of unobserved productive ability is unchanged from cohort to cohort, employers infer ability from education level relative to others in the same age cohort, not from the absolute level of education. Thus the authors include both the absolute and the relative education level in their model, reasoning that a strong positive coefficient on the absolute level is indicative of the effect of accumulated human capital, while a strong positive coefficient on the relative level is indicative of the importance of screening. Applying their method to eight different samples, using several specifications, they find that the relative level of education is rarely significant, leading them to conclude that the signaling effect is weak relative to the productivity enhancing effect.

The preponderance of empirical evidence, as represented by the three approaches noted above and other recent work, suggests that the human capital model explains more of the relationship between education and earnings than the screening model. This conclusion must be tempered with caution however. Most of the attempts to separate the explanations are not fully successful, because human capital and signaling "stories" can be told that are consistent with the results. As Weiss (1995) points out, "the [signaling] approach has gained broad acceptance among microeconomic theorists, but many labor economists remain skeptical." He suggests that screening/signaling models are especially good at

explaining certain facts—for example, why the variance of wages increases with education, or why there is often a discontinuously large return to completion of high school or college (the so-called "sheepskin" effect). He also cites studies, quite different from any reported in this synthesis, regarding returns to specific cognitive skills and to courses taken in secondary school, which seem to favor a screening explanation. In all of these cases of course, there are at least ad hoc explanations that are consistent with a human capital story as well. Our reading of the evidence at this point is that both processes are at work, but it is our impression that human capital theory explains more of the variance in outcomes such as wages and earnings than does screening theory.

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